

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

BRIDGESTONE SPORTS CO., LTD. and  
BRIDGESTONE GOLF, INC.,

*Plaintiffs,*

v.

ACUSHNET COMPANY,

*Defendant.*

C.A. No. 05-132 (JJF)

REDACTED –  
PUBLIC VERSION

**BRIDGESTONE'S DAUBERT MOTION TO PRECLUDE DR. DAVID FELKER  
FROM OFFERING TESTIMONY REGARDING INVALIDITY AND NON-  
INFRINGEMENT OF THE BRIDGESTONE PATENTS**

This is a patent infringement action brought by Plaintiffs Bridgestone Sports Co., Ltd. and Bridgestone Golf, Inc. (collectively "Bridgestone") against Defendant Acushnet Company ("Acushnet") in March 2005. Bridgestone asserts that various Acushnet golf balls infringe seven Bridgestone patents.

Acushnet served the invalidity expert report of Dr. David Felker on January 16, 2007, and, even though the Court said "there is insufficient time to allow further supplementation of Acushnet's expert report" (D.I. 291 at p. 5.), served two supplemental invalidity expert reports on March 2 and March 7, 2007. Acushnet also served the non-infringement expert report of Dr. Felker on February 20, 2007.

Dr. Felker's proffered testimony fails to meet the requirements of Federal Rules of Evidence 702 and 703 because (1) Dr. Felker is not a person of at least "ordinary skill in the art" and therefore cannot assist the trier of fact in resolving Acushnet's claims of non-infringement and invalidity and (2) Dr. Felker's opinions are based on incomplete test results and data, which counsel for Acushnet selectively provided to him, and are therefore unreliable.

Bridgestone requests that the Court preclude Dr. Felker from testifying about the alleged non-infringement and invalidity of the Bridgestone patents.

I. Dr. Felker Is Not Qualified To Testify On Non-Infringement Or Invalidity Because By His Own Admission He Is Not One Of Ordinary Skill In The Art

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Federal Rule of Evidence 702 requires that an expert be qualified by virtue of specialized expertise in order to offer an opinion:

[I]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training or education, may testify thereto in the form of an opinion or otherwise.

In the patent context, Rule 702 requires that a non-infringement or invalidity expert at least be one of “ordinary skill in the art.” Patent specifications and claims are drafted for someone of ordinary skill in the art, and determinations of infringement and invalidity require (1) that the claims be construed by someone of ordinary skill in the art and (2) a comparison be made of the accused device (in the case for infringement) or of prior art (in the case for validity) to the claims, as construed. *See, e.g., AquaTex Indus., Inc. v. Techniche Solutions*, 479 F.3d 1320, 1329 (Fed. Cir. 2007); *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007).

What one of “ordinary skill in the art” knew or would have known on the date of creation of an invention is central to evaluating these defenses. *Tel -Lock, Inc. v. Thomson Consumer Elec.*, No. 03 C 320, 2005 WL 741930, at \*8 (N.D. Ill. Mar. 30, 2005) (“The court cannot imagine how an individual lacking even ordinary skill in the relevant art can offer reliable expert testimony [on the defense of obviousness]...”); *Liquid Dynamics Corp. v. Vaughan Company, Inc.*, No. 01 C 6934, 2004 WL 2260626, at \*8 (N.D. Ill. Oct. 1, 2004) (“Typically, testimony concerning anticipation must be testimony from one skilled in the art...”); *Neutrino Dev. Corp. v. Sonosite, Inc.*, 410 F. Supp. 2d 529, 536 (S.D. Tex. 2006) (“...[the law] require[s]

that she [be] sufficiently qualified to construe the patent and understand the design and components of the claimed invention as one with ordinary skill in the art....”).

In *Tel-Lock*, the plaintiffs sought to offer purported expert opinion testimony on the issue of obviousness. The proffered expert specialized in patent law and had a bachelor of science in chemical engineering. 2005 WL 741930 at \*7. By the expert’s own admission, however, he was not one of at least ordinary skill in the art. *Id.* at \*7-8. As a result, the court excluded his testimony on the issue of obviousness for failure to comply with Rule 702. *Id.* at \*8.

Similarly, the Court should exclude Dr. Felker’s testimony on the issues of non-infringement and invalidity. Dr. Felker stated in his invalidity expert report that “one of ordinary skill in the art at the relevant time period for each of the Bridgestone patents. . . would have had a B.S. in chemistry or an equivalent discipline with five or more years of experience in the golf ball manufacturing field” (Exh. A, Felker Invalidity Report, p. 3). Dr. Felker does not come close to meeting even his own standard.

Dr. Felker’s work experience falls substantially short of the minimum of five years in the golf ball manufacturing field.<sup>1</sup> Dr. Felker spent no more than three years and ten months as Vice President of Research & Development at Callaway Golf Ball Company (“Callaway”) (Exh. A-1, Exhibit 1 to Felker Invalidity Report, p. 2). As a Vice President, he spent significant time on administrative matters and not engineering-related activities.

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<sup>1</sup> Bridgestone’s expert, John Calabria, agrees that one of ordinary skill in the art must have at least five years of experience (Exh. B, Calabria Report, p. 7) (“...one of ordinary skill in the art would be someone who has: (1) a technical undergraduate degree (*e.g.*, mechanical engineering, physics, materials science, chemical engineering, or chemistry); and (2) at least five years of experience working in the golf ball industry as design and/or development engineer. Five years of manufacturing experience alone would not suffice.”).

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In this light, it is no surprise that Dr. Felker has never been qualified as an expert in a golf ball trial, and at the one golf ball trial in which he testified, he “was simply a fact witness” (*id.* at 37:1-10). Dr. Felker has admitted to lacking even ordinary skill in the relevant art, and thus cannot offer reliable expert testimony so to assist the trier of fact in deciding the issues of non-infringement and invalidity of the Bridgestone Patents. Rule 702 demands that the Court exclude such testimony from him at trial.

II. Dr. Felker’s Testimony Is Inherently Unreliable Because It Is Based On A Filtered Set Of Test Results Of Counsel For Acushnet’s Choosing

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), the Supreme Court set out an analytical framework for district courts to determine the admissibility

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of expert testimony. The Third Circuit has since applied *Daubert* on several occasions when explaining that, “while [Federal Rule of Evidence] 702 is the ‘primary locus’ of a District Court’s gatekeeping role, it also must look to other rules, including [Federal Rule of Evidence] 703.” *Montgomery County v. Microvote Corp.*, 320 F.3d 440, 448 (3d Cir. 2003); *Crowley v. Chait*, 322 F. Supp. 2d 530, 546 (D.N.J. 2004).

Rules 702 and 703 proscribe expert testimony that is not based on sound data. Rule 702 provides that an expert witness with “scientific, technical, or other specialized knowledge” may testify in the form of an opinion “if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case” (emphasis added). In expounding upon Rule 702’s “sufficient facts or data” requirement, Rule 703 further provides that such facts or data must be “of a type reasonably relied upon by experts in the particular field in forming opinions or inferences upon the subject.”

Expert testimony based upon a filtered set of facts or data of legal counsel’s choosing is inherently unreliable. Attorneys cannot select the information to funnel to the expert because they are not competent to determine whether particular material should be relied upon or rejected. *Montgomery County*, 320 F.3d at 448; *In re TMI Litig.*, 193 F.3d 613, 697-98 (3d Cir. 1999); *Crowley*, 322 F. Supp. 2d at 546. This is especially true where, as is the case here, the information held back by the attorneys may be detrimental to their positions on key issues.

In *Crowley*, for example, the District Court of New Jersey excluded an expert witness who was “spoonfed depositions [that] led him to draw questionable conclusions. . .that he might not have drawn had he properly reviewed all of the depositions in an unfiltered fashion.” *Id.* at 547. “By reviewing only those depositions provided to him by Plaintiff’s

counsel, and by reviewing what appears to be for the most part only pre-selected excerpts of those depositions, [the expert] relied upon information that is simply too unreliable to be trusted.” *Id.*

Acushnet bears the burden of establishing admissibility by a preponderance of the evidence. *DSU Med. Corp. v. JMS Co.*, 296 F. Supp. 2d 1140, 1146-47 (N.D. Cal. 2003). “If the data underlying ‘[Dr. Felker’s] expert’s opinion [is] so unreliable that no reasonable expert could base an opinion on them, the opinion resting on that data must be excluded.’” *Montgomery County*, 320 F.3d at 448.

1. Acushnet’s Counsel Injected Itself Between Dr. Felker And The Acushnet Employees Who Performed The Tests Upon Which Dr. Felker Relies

Bridgestone has learned through depositions that Acushnet employees conducted nearly all of the tests relied upon by Dr. Felker in his invalidity and non-infringement reports. Some of these tests were conducted back in the 1990’s, some around 2000, some more recently but prior to the commencement of this case, and some in the past few months. Dr. Felker, who was not present for the tests (Exh. D, Dalton Depo., 196:16-197:8, 257:4-9), relied on Acushnet’s lawyers to provide the Acushnet employees with instructions on how to conduct them<sup>3</sup> (Exh. C, Felker Depo., 244:16-22; Exh. E, Bulpett Depo., 16:21-18:3). Thereafter, the Acushnet lawyers’ influence over the tests and the test results progressed even further.

Counsel for Acushnet provided some of these test results to Dr. Felker (albeit selectively) so that he could rely upon them in his expert report on invalidity. Jeffrey Dalton, an Acushnet employee who was involved in performing a majority of these tests, repeatedly

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<sup>3</sup> To the extent that Dr. Felker provided the instructions for the tests underlying his invalidity report, those tests fail to meet the reliability requirement under Federal Rule of Evidence 702. As coming from one not of ordinary skill in the art, Dr. Felker’s instructions are unreliable and thus so too are the results in connection therewith.

testified that counsel for Acushnet served as the intermediary through which the results of these tests were passed to Dr. Felker:

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2. Counsel For Acushnet Selectively Fed Dr. Felker Certain Test Results  
While Simultaneously Holding Back Others

Counsel for Acushnet took advantage of its position as the intermediary between Dr. Felker and the Acushnet employees who performed the tests that he relies upon in his expert reports. Rather than provide Dr. Felker with a complete set of test results, counsel for Acushnet selectively fed him only those results and data that it believes supports its positions, while failing to provide him with those that do not. Dr. Felker's reports are thus inherently unreliable.

Exhibit 13 to Dr. Felker's invalidity report contains numerous results of testing that Mr. Dalton performed on the Wilson Ultra Tour Balata ball, including measurements as to ball diameter before and after sandblasting, casing diameter, cover thickness, specific gravity and hardness<sup>4</sup> (Exh. A-2, Exh. 13 to Felker Invalidity Report). Missing from Exhibit 13 are cover hardness and plaque hardness measurements – which is odd, considering that Mr. Dalton

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<sup>4</sup> Dr. Felker relies on these tests to support Acushnet's contention that the Wilson Ultra Tour Balata ball is the commercial embodiment of the asserted prior art Proudfit '187 Patent, and thus invalidates Bridgestone's '852 Patent (Exh. A, Felker Invalidity Report, pp. 19-20).

confirmed in his deposition that he (a) performed these tests, (b) provided that data to counsel for Acushnet, and (c) still had the data in his possession:

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<sup>5</sup> Based on Mr. Dalton's previous testimony, this statement can only be interpreted to mean that he provided this data to counsel for Acushnet, who in his opinion presumably provided it to Dr. Felker. If the data went straight to Dr. Felker, Acushnet has an obligation to produce it under Federal Rule of Civil Procedure 26, as briefed in Bridgestone's Motion To Compel Production Of Documents and Reply in support thereof (D.I. 344; D.I. 424).



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Equally concerning is that Acushnet supplemented Dr. Felker's invalidity expert report with "results from additional testing by Acushnet regarding the EP '043 reference" (Exh. F, Felker 03/07/2007 Supp. Invalidity Report, Paper 1), which were later confirmed to have only included a selective sampling of the hardness gradient measurements on the tested cores.

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Further troubling is that counsel for Acushnet filtered the data included in this report. When the cores and results were unfavorable to Acushnet – because they had hardness gradients of "less than 8" – Acushnet "did not retain the core or the measurement results" (*id.* at Paper 2).

Counsel for Acushnet also asked Mr. Dalton to prepare the summary charts attached at Exhibit E to his Declaration concerning core formulation documentation (Exh. D, Dalton Depo., 92:3-93:20; Exh. G, Dalton Decl.; Exh. G-1, Exh. E to Dalton Decl.), upon which Dr. Felker relied in his non-infringement report (Exh. H, Felker Non-Infringement Report). Mr. Dalton testified that he did not have any interaction with Dr. Felker in the preparation of his Declaration or the summary tables (*id.* at 93:14-17) – because Patrick Elliott and Rastko Gajic, two other Acushnet employees, prepared them (Exh. C, Felker Depo., 286:15-289:19). Consistent with its pattern of practice, counsel for Acushnet first reviewed this data before passing it on to Dr. Felker (Exh. I, Elliott Depo., 89:7-90:11). Even worse, counsel for Acushnet

had instructed Mr. Gajic to only include in the charts formulations that counsel for Acushnet believed to be the relevant raw materials (Exh. J, Gajic Depo. 106:15-107:21).

Given that counsel for Acushnet separated Dr. Felker from the Acushnet employees who performed the tests, and that the record establishes that certain test results and data were omitted, “not retained” or otherwise filtered by Acushnet’s counsel before prior to providing them to Dr. Felker, it appears that counsel for Acushnet spoonfed Dr. Felker only those test results and data that it believes are favorable to its positions while simultaneously holding back those that are not.

### CONCLUSION

Bridgestone requests that the Court preclude Acushnet from presenting testimony from Dr. Felker as to the asserted invalidity and non-infringement of Bridgestone’s asserted patents.

MORRIS, NICHOLS, ARSHT & TUNNELL LLP

*/s/ Leslie A. Polizoti*

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Redacted Filing Date: May 10, 2007

CERTIFICATE OF SERVICE

I certify that on May 10, 2007 I electronically filed the foregoing with the Clerk of the Court using CM/ECF, which will send notification of such filing(s) to Richard L. Horwitz and David E. Moore.

I further certify that I caused copies to be served upon the following on May 10, 2007 in the manner indicated:

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# EXHIBIT A

UNITED STATES DISTRICT COURT  
DISTRICT OF DELAWARE

BRIDGESTONE SPORTS CO., LTD., and  
BRIDGESTONE GOLF, INC.,

Plaintiffs,

v.

ACUSHNET COMPANY,

Defendant.

Case No. 05-CA-132 (JJF)

**INVALIDITY EXPERT REPORT OF  
DR. DAVID FELKER**

ACUSHNET COMPANY,

Counterclaimant,

v.

BRIDGESTONE SPORTS CO., LTD., and  
BRIDGESTONE GOLF, INC.,

Counterdefendant.

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## **I. INTRODUCTION**

I have been retained by the Acushnet Company ("Acushnet") to testify as an expert in this case and to review U.S. Patent Nos. 5,553,852 ("the '852 patent"), 5,743,817 ("the '817 patent"), U.S. Patent No. 5,782,707 (the '707 patent), U.S. Patent No. 5,803,834 (the '834 patent) and U.S. Patent No. 6,6791,791 (the '791 patent) (collectively, the "Bridgestone patents").

I understand that Bridgestone is asserting infringement by Acushnet of claims 1, 6, and 7 of the '852 patent, claim 1 of the '817 patent, claim 1 of the '707 patent, claim 1 of the '834 patent and claims 11, 13, 16 and 26 of the '791 patent.

In this report, I provide my expert opinion regarding whether the asserted claims are valid in light of principles of patent law, as those principles have been explained to me.

## **II. QUALIFICATIONS/BACKGROUND**

During the past six years, I have served as a golf ball industry consultant and expert witness. I have provided technical advice and expert testimony in golf ball technology-related cases, performed patent analysis and provided technical advice, lead scientific efforts to demonstrate performance differences between golf products and performed and/or directed physical property testing and outdoor performance comparison testing efforts.

Prior to my work as a consultant, I spent four years as Vice President of Research & Development at Callaway Golf Ball Company and spent thirteen years at E.I. Dupont de Nemours in various research and manufacturing technical positions, culminating with two years as Technology Superintendent-Neoprene at duPont Dow Elastomers. I have a M.S. and Ph.D. in Chemical Engineering from Iowa State University, and a B.S. in Chemistry from the University of Wisconsin at Eau Claire. I have eight patents in my name related to golf balls and golf clubs. At Callaway, I lead the development of four golf balls, including the highly successful *Rule 35* and *HX*.

A copy of my *curriculum vitae*, including a list of my publications, is attached as Exhibit 1.<sup>1</sup>

### III. MATERIALS REVIEWED AND CONSIDERED

A list of the materials I reviewed and considered in the preparation of this report can be found at Exhibit 2. I have also relied on my professional and educational experience in the field of golf ball design and manufacture, as outlined above.

### IV. PRINCIPLES OF PATENT LAW

Although I am not a lawyer, I have been informed of some basic legal principles, which I have used to perform the analysis found in this report. I understand that the patent laws provide rules as to what constitutes prior art. For instance, I have been informed that if a printed publication is published, or a U.S. patent is issued, or the invention was publicly used, more than one year before the filing of an application, that reference is prior art. I also have been informed that an issued U.S. patent, filed before the filing date of the application in question, but issued after the filing date of the application in question, is also prior art. I understand that the patent statutes provide for other definitions of prior art. I have been informed that a person is not entitled to a patent if the claimed invention was described in a printed publication, was patented, was publicly used, or was known to others prior to the invention of the claimed subject matter. I understand that a claim is invalid as "anticipated" if a single prior art reference teaches each and every limitation of the claim, either expressly or inherently. I understand that an inherent limitation is one that is necessarily present. I also understand that, even though not anticipated, a claim may still be rendered invalid if the claim was obvious in view of the prior art. In determining whether a claim was obvious, I understand an inquiry into the following factors is proper:

- a. The scope and content of the prior art;

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<sup>1</sup> I am being compensated \$325/hr for the time spent in preparing this report and \$375/hr for testifying.

- b. The level of ordinary skill in the art;
- c. The differences between the claimed invention and the prior art;
- d. Whether the differences are such that the claimed invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made; and
- e. Whether secondary considerations exist, such as long-felt but unresolved need, failure of others, commercial success, licensing, copying, etc., and, if so, whether there is a nexus between the secondary consideration and the claimed invention.

I have considered the above criteria in performing my analysis and forming my opinions found in this report. I understand that under U.S. patent laws, issued patents are presumed valid, but that presumption can be rebutted. I further understand that the presumption of validity is more easily overcome where the evidence consists of material prior art not cited by the patentee and not considered by the Examiner during prosecution. I also understand that when reviewing the validity of a claim, the analysis is to be performed from the perspective of one of ordinary skill in the art. In my opinion, one of ordinary skill in the art at the relevant time period for each of the Bridgestone patents I address would have had a B.S. in chemistry or an equivalent discipline with five or more years of experience in the golf ball manufacturing field.

I understand that a U.S. patent application may claim the benefit of an earlier filing date of a foreign application(s). To obtain this benefit, certain rules must be followed, one of which, as I understand it, is that the foreign patent application must contain a written description of the invention, and of the manner and process of making and using the invention, in such full, clear, concise, and exact terms as to enable any person skilled in art to which it pertains to make and to use the full scope of the invention as claimed.

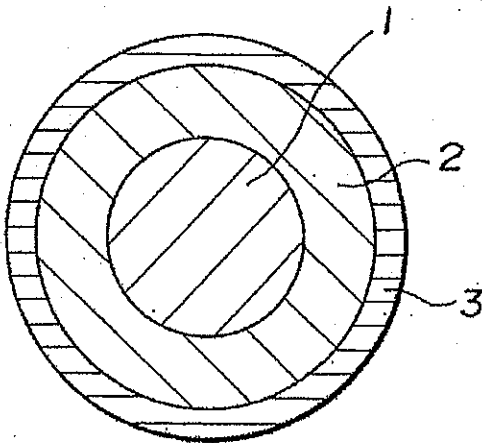
## V. THE '852 PATENT

### A. Disclosure of the '852 Patent

The '852 patent relates to three-piece golf balls comprising a core, and intermediate layer and an outer cover. The center core of the golf ball claimed in the '852 patent has a diameter of at least 29 mm and a specific gravity of less than 1.4. The intermediate layer of the '852 ball has

a thickness of at least 1 mm, a specific gravity of less than 1.2 and a hardness of at least 85 on JIS C scale. The outer cover layer of the '852 ball has a thickness between 1 – 3 mm and is softer than the intermediate layer. The '852 patent states that this combination of features results in a ball that has a good total balance of properties in that feeling and controllability are improved with no sacrifice to flying performance and durability.

I understand that Bridgestone alleges that Acushnet infringes claims 1, 6 and 7 of the '852 patent. Claim 1 of the '852 patent is an independent claim. Claims 6 and 7 are both dependent claims that depend from claim 1. Figure 1 of the '852 patent, reproduced below, shows a multi-piece golf ball of the claimed invention, with a solid core (1), an inner cover (2) and an outer cover (3):



Claim 1 of the '852 patent reads:

A three-piece solid golf ball comprising:

a center core, an intermediate layer, and a cover enclosing the core through the intermediate layer, said center core having a diameter of at least 29 mm and a specific gravity of less than 1.4, said intermediate layer having a thickness of at least 1 mm, a specific gravity of less than 1.2, and a hardness of at least 85 on JIS C scale, the specific gravity of said intermediate layer being lower than the specific gravity of said center core, and said cover having a thickness of 1 to 3 mm and being softer than said intermediate layer.

Claim 6 of the '852 patent reads:

The golf ball of claim 1 wherein a difference in the specific gravity between the center core and the intermediate layer is in the range of 0.1 to 0.5.

Claim 7 of the '852 patent reads:

The golf ball of claim 1 wherein the specific gravity of said intermediate layer is in the range of 0.9 to 1.0.

A copy of the '852 patent is attached to this report as Exhibit 3.

**B. Prosecution History of the '852 Patent**

The '852 patent, entitled "Three-Piece Solid Golf Ball," issued on September 10, 1996, from a patent application filed on July 8, 1994 claiming priority to Japanese Patent Application No. 5-193065, filed July 8, 1993. As originally filed, the application had 4 claims, including the sole independent claim, which read:

A three-piece solid golf ball comprising a center core, an intermediate layer, and a cover enclosing the core through the intermediate layer,

said center core having a diameter of at least 29 mm and a specific gravity of less than 1.4,

said intermediate layer having a thickness of at least 1 mm, a specific gravity of less than 1.2, and a hardness of at least 85 on JIS C scale, the specific gravity of said intermediate layer being lower than the specific gravity of said center core, and said cover having a thickness of 1 to 3 mm.

(Ex. 4, '852 Prosecution History, at Original Claim 1).

These claims were rejected by the Patent and Trademark Office (PTO) Examiner. (*Id.*, at Office Action mailed May 18, 1995). The Examiner explained:

Claims 1-4 are rejected under 35 U.S.C. § 102(a) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Molitor et al., Nakahara et al., Kamada et al., Chikaraishi et al., Kim et al. and Viollaz, each taken alone. As understood, inherent features of the reference [sic] golf balls are claimed. The burden is on applicants to show that inherency is not involved. Any possible distinctions over said references involve the arbitrary substitution of another known material for the balls intermediate layer, and such would be obvious to a person having ordinary skill in the art.

(*Id.* at 3.)

Following the Examiner's rejection, Bridgestone amended claim 1 and added new claims 5-8. Claim 1 was amended to require that the cover be softer than the intermediate layer. (*Id.*, at Amendment under 37 C.F.R. § 1.115 at 2-3.) Bridgestone argued against each of the prior art references individually noting that each failed to teach an intermediate layer that was harder than each of the core and the cover layer, and thus, resulted in inferior feel and flight distance versus golf balls of the Bridgestone application. (*Id.*)

Bridgestone supported its position through the declaration of Mr. Yamagishi, one of the inventors of the '852 patent. The declaration quoted a number of passages from the specification describing how the golf balls of the invention were made and described how subjective characteristics (e.g., "feel") were improved. (*Id.*, at Yamagishi Declaration). Following these arguments and the submission of this declaration, the Examiner allowed the claims. (*Id.*, at Notice of Allowability Dec. 26, 1995.)

**C. Opinion Regarding the Validity of Claims 1, 6, and 7 of the '852 Patent**

As set forth in detail below, I have analyzed the '852 patent and based on the perspective of one of ordinary skill in the art. In my opinion, claims 1, 6 and 7 of the '852 patent are anticipated and/or rendered obvious by the prior art.

**1. The Asserted Claims of the '852 Patent Are Anticipated**

**a. U.S. Patent No. 4,431,193 to Nesbitt Anticipates Claim 1**

U.S. Patent No. 4,431,193 to Nesbitt ("Nesbitt '193") (Ex. 5) issued February 14, 1984, based on an application filed August 25, 1981. As Nesbitt '193 issued as a patent a decade before the earliest priority date of the '852 patent (July 8, 1993), I understand that Nesbitt '193 is prior art.

Nesbitt '193 discloses a multi-piece solid golf ball, which has a solid core, an intermediate layer and an outer cover layer. (Ex. 5, Nesbitt '193 at col. 2, lines 30-50). Figure 1

of the Nesbitt '193 patent, reproduced below, shows a multi-piece golf ball (10), with a solid core (12), an intermediate layer (14) and an outer cover (16):

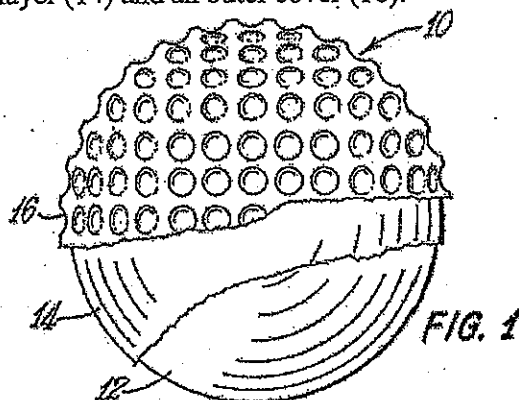
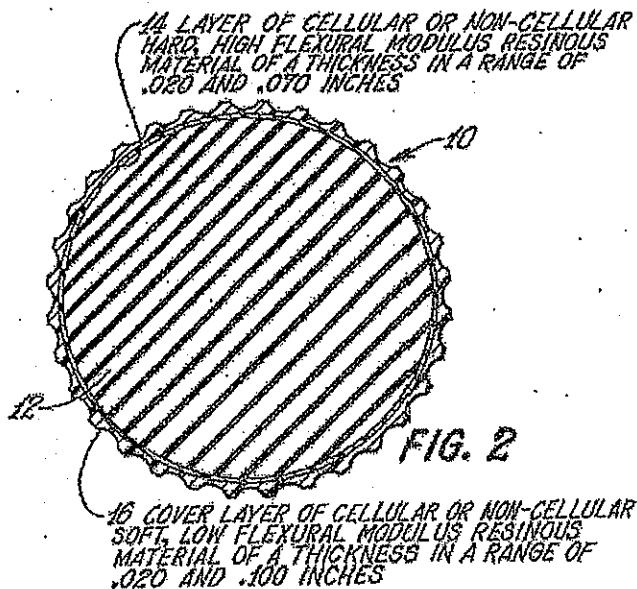


Figure 2 of the Nesbitt '193 patent, reproduced below, describes the intermediate layer (14) as a hard resinous material (Type 1605 Surlyn) with a thickness in a range of 0.020 to 0.070 inches and the outer cover (16) as a comparatively softer resinous material (Type 1855 Surlyn) with a thickness in a range of 0.020 to 0.100 inches:



Nesbitt '193 discloses that the intermediate layer is of a thickness in a range of 0.020 inches and 0.070 inches and may be "Type 1605 Surlyn" marketed by E. I. du Pont de Nemours



and Company ("du Pont"). (Ex. 5, Nesbitt '193, at Abstract; col. 3, lines 16-22). Nesbitt '193 further discloses that the outer cover is of a thickness of 0.020 inches and 0.100 inches and may be Type 1855 Surlyn," also marketed by du Pont. (Ex. 5, Nesbitt '193, at Abstract; col. 3, lines 22-25). Nesbitt '193 also incorporates by reference the IML layer and cover materials in U.S. Patent No. 4,272,637 to Molitor ("Molitor '637") (Ex. 5, Nesbitt '193, col. 3, lines 51-60).

Surlyn is a du Pont trademark for an ionomer resin. An ionomer resin is a thermoplastic polymer that is "ionically crosslinked." Surlyn resins are derived from ethylene / methacrylic acid copolymers. du Pont manufactures several grades of Surlyn resins, including the Surlyn 1605 and Surlyn 1855, described in the Nesbitt '193 patent. There are several applications for Surlyn ionomer resins, including golf ball covers, automotive rub strip, athletic shoe soles, lacrosse sticks, toys, cosmetic packaging, wire and cable insulation, and ski boots.

I have reviewed the Nesbitt '193 patent in light of claim 1. It is my opinion that Nesbitt '193 discloses each and every limitation of claim 1, and therefore anticipates claim 1.

**(1) The Layer Thicknesses of the Nesbitt '193 Ball Meets the Requirements of Claim 1 of the '852 Patent**

The Nesbitt '193 discloses a golf ball having a total diameter of at least 1.680 inches, which is the minimum diameter prescribed by the United States Golf Association Rules. (Ex. 5, Nesbitt '193 at col. 2, lines 50-58; col. 3, line 12.) One inch is equal to 25.4 millimeters. Therefore, 1.680 inches equates to 42.67 millimeters.

The Nesbitt '193 patent discloses that the outer cover has a thickness of 0.020 inches to 0.100 inches. (Ex. 5, Nesbitt '193 at col. 3, lines 22-25.) This equates to 0.508 mm to 2.54 mm. The Nesbitt '193 patent discloses that the intermediate layer may have a thickness of 0.020 inches to 0.070 inches. (Ex. 5, Nesbitt '193 at col. 3, lines 19-22.) This equates to 0.508 mm to 1.778 mm. Subtracting the thickness of the intermediate layer and outer cover from the diameter of the ball, and converting to millimeters, I determined that the diameter of the core disclosed in Nesbitt '193 ranges from 34.04 mm to 40.64 mm. In summary:

Layer	'852 Thickness Claim Requirements	Thickness of Layers Nesbitt '193 Prior Art
Outer Cover	Between 1 – 3 mm	0.508 mm - 2.54 mm
Intermediate Layer	At least 1 mm	0.508 mm – 1.778 mm
Core (diameter)	At least 29 mm	34.04 mm to 40.64 mm

**(2) The Specific Gravity of the Nesbitt '193 Ball Meets the Requirements of Claim 1 of the '852 Patent**

The material forming the intermediate layer of the golf ball disclosed in the Nesbitt '193 patent is Surlyn 1605. (Ex. 5, Nesbitt '193 at col. 3, lines 19-22.) According to the product brochure by du Pont, the specific gravity for Surlyn 1605 is 0.95. (Ex. 6). Thus, the intermediate layer of the Nesbitt golf ball has a specific gravity within the range of the golf ball disclosed in claims of '852 patent.

Similarly, one material forming the outer cover layer of the golf ball disclosed in the Nesbitt '193 patent is Surlyn 1855. (Ex. 5, Nesbitt '193 at col. 3, lines 22-25.) According to the product brochure by du Pont, the specific gravity for Surlyn 1855 is 0.96. (Ex. 6).<sup>2</sup>

The Nesbitt '193 patent does not explicitly state the specific gravity of the center core. However, the specific gravity of the Nesbitt '193 core can be easily calculated from its volume, weight and density (values that can be determined from the Nesbitt' 193 patent) by performing a few simple calculations, as detailed below.

**(3) Volume of the Nesbitt '193 Ball**

The volume of a spherical object may be determined if you know its diameter, using an equation from geometry:

$$\text{Volume of the sphere} = 4/3 \pi (\text{diameter of the sphere} / 2)^3$$

<sup>2</sup> The Nesbitt '193 patent discloses that the intermediate layer and the outer cover layer can be formed by molding the Surlyn material into a spherical shape. (Ex. 5, Nesbitt '193 at col. 3, lines 26-29 and 33-38.) It is my understanding and it has been my experience that injection molding is a well-known method of making solid golf balls and that this method does not significantly affect the specific gravity or hardness of raw Surlyn materials.

Applying this equation, I calculated that a golf ball with a diameter of 1.680 inches (4.267 cm) has a total volume of 40.68 cm<sup>3</sup>.

I also calculated that the Nesbitt '193 core, which has a diameter between 34.04 mm to 40.64 mm, would have a core volume from 20.64 cm<sup>3</sup> to 35.14 cm<sup>3</sup>.

The Nesbitt '193 intermediate layer, which has a diameter of 0.508 mm to 1.778 mm, would have an intermediate layer volume that ranged from 2.19 cm<sup>3</sup> to 8.89 cm<sup>3</sup> for a golf ball with a diameter of 1.680 inches.

The Nesbitt '193 outer cover layer, which has a diameter of 0.508 mm to 2.54 mm, would have an outer cover layer volume from 2.84 cm<sup>3</sup> to 12.87 cm<sup>3</sup> for a golf ball with a diameter of 1.680 inches. In summary:

Nesbit '193 Layer	Calculated Volume (cm <sup>3</sup> )
Outer Cover Layer	2.84 – 12.87
Intermediate Layer	2.19 – 8.89
Core	20.64 – 35.14

#### (4) Weight of the Nesbitt '193 Ball

Nesbitt '193 states that the weight of the total ball is 1.620 ounces. This is the maximum prescribed weight allowed by The United States Golf Association Rules. (Ex. 5, Nesbitt '193, at col. 2, lines 50-58). Because the total weight of the ball is known, the weight of the core of a three-piece solid golf ball can be determined by subtracting the weight of the intermediate layer and the weight of the outer cover from the total weight of the ball. The weight of the intermediate layer and the weight of the outer cover of the Nesbitt '193 golf ball can be calculated from their volume using their known density.

The density of an object is the weight of the object divided by the volume of the object. Therefore, the weight of an object equals its volume multiplied by its density.

Specific gravity is the ratio of the density of any substance to the density of water. The density of water is  $1.0 \text{ g/cm}^3$  at  $20^\circ\text{C}$ . Thus, the density of an object measured in units of  $\text{g/cm}^3$ , is equal to its specific gravity. Surlyn 1605, which has a specific gravity of 0.95, has a density of  $0.95 \text{ g/cm}^3$ . Surlyn 1855, which has a specific gravity of 0.96, has a density of  $0.96 \text{ g/cm}^3$ .

Using the density and the volume ranges calculated above, I determined the weight of the outer cover layer of the Nesbitt '193 golf ball ranges from 2.72 grams to 12.35 grams, for a golf ball weighing 1.620 ounces (45.93 grams).

Using the density and the volume ranges calculated above, I determined the weight of the intermediate layer of the Nesbitt '193 golf ball ranges from 2.09 grams to 8.44 grams, for a golf ball weighing 1.620 ounces (45.93 grams).

The total weight of the Nesbitt '193 ball is 1.620 ounces. (Ex. 5, Nesbitt '193 at col. 3, lines 19-25.) Subtracting the weight of the outer cover and the weight of the intermediate layer from the overall weight of the ball, I determined the weight of the core in the Nesbitt '193 ball ranges from 26.76 grams to 40.64 grams. In summary:

Nesbitt '193 Layer	Calculated Weight (grams)
Outer Layer	2.72 – 12.35
Intermediate Layer	2.09 – 8.44
Core	26.76 – 40.64

The density of the core is the core weight divided by the core volume. Using the values calculated above for the core weight and core volume, I determined the density of the Nesbitt core ranges from  $1.156 \text{ g/cm}^3$  to  $1.296 \text{ g/cm}^3$ . Therefore, the specific gravity of the core of the Nesbitt '193 patent ball ranges from 1.156 to 1.296. In summary:

Nesbitt '193 Layer	Specific Gravity (g/cm <sup>3</sup> )
Outer Layer	0.96
Intermediate Layer	0.95
Core	1.156 – 1.296

**(5) Specific Gravity of the Nesbitt '193 Ball with Dimples**

I then analyzed what affect, if any, the presence of dimples on the golf ball would have on the specific gravity of the Nesbitt '193 ball. I found that even in the most extreme case, where the dimples occupy 100% of the volume of the cover and thus the weight of the cover would be 0 grams in this theoretical instance, the Nesbitt '193 patent still discloses a golf ball having a core specific gravity of less than 1.4. Specifically, I re-calculated the specific gravity of the core of a "dimpled" ball, using values disclosed by the Nesbitt '193 patent that are also within the ranges claimed in the '852 patent. I selected an outside cover layer thickness of 1.0 mm (0.394 inches) and an intermediate layer thickness of 1.0 mm. These are the minimum values claimed in the '852 patent.

I then calculated the specific gravity of the core of this ball assuming that the entire volume of the cover layer of this ball was occupied by dimples, and thus the cover had a weight of 0 grams. The specific gravity of the core of such a ball would be 1.361. (See Exhibit 7 for a detailed explanation of this calculation).

Because the dimple volume can never exceed the volume of the cover, it can be said with certainty that the Nesbitt '193 patent discloses a golf ball having the physical dimensions of the '852 patent and core specific gravity of less than 1.4 for any dimple volume.

**(6) The Hardness of the Nesbitt '193 Ball is Within the Claims of the '852 Patent**

The Nesbitt patent expressly discloses that the intermediate layer is made of Surlyn 1605, and the outer cover is made of Surlyn 1855. The Shore-D hardness for Surlyn 1605 is 67. (Ex. 6). The Shore-D hardness for Surlyn 1855 is 56. (Ex. 6). Published references from du Pont disclose the relationship between Shore D hardness and JIS-C hardness as follows:  $\text{Shore D} = 0.76 * \text{JISC} - 8$ . (Ex. 8)

Substituting the disclosed Shore D values for Surlyn 1605 (intermediate layer) and 1855 (outer cover) and solving for JIS-C hardness, I calculate that the JIS-C hardness of Surlyn 1605 is 99, and the JIS-C hardness of Surlyn 1855 is 84. The intermediate layer of the Nesbitt '193 ball is at least 85 on the JIS-C scale and is harder than the outer cover layer.

**(7) Unfoamed and Foamed Layers**

Golf ball layers can either be foamed or unfoamed. Foamed layers can be formed from natural or synthetic polymeric materials by injecting a gas into the materials. (See Ex. 9, U.S. Patent 4,274,637 to Molitor). Foaming is used to alter or regulate the coefficient of restitution. The coefficient of restitution of a golf ball is generally indicative of the resiliency of the ball, and hence indicative of how far the ball will travel when struck. Typically, a foamed layer is somewhat lighter, less dense and softer than an unfoamed layer.

The Nesbitt '193 patent discloses using both foamed and unfoamed layers. The Nesbitt '193 ball, therefore, can be made using either foamed or unfoamed cover layers. (Ex. 5, Nesbitt '193, at col. 3, lines 51-54: "either of the layers may be cellular when formed of a foamed natural or synthetic polymeric material."; col. 4, lines 1-2: "The inner, intermediate or first layer 14 may be unfoamed or noncellular . . . the outer or cover layer or ply 16 may be of unfoamed or noncellular material."; col. 3, lines 65-68: "The outer or cover layer or second layer 16 may

be foamed to a greater degree than the inner, intermediate, or first layer 14 as the material of the layer 16 is comparatively soft.”<sup>3</sup>

It is my understanding that so long as one embodiment of a prior art reference discloses all of the elements of a claim, the claim is invalid, regardless of whether other embodiments of the prior art reference do not. As shown above, an unfoamed golf ball made according to the Nesbit ‘193 patent with a 1.0 mm thick Surlyn 1605 intermediate layer and a 1.0 mm thick Surlyn 1855 outer cover, would anticipate the ‘852 patent.

There are many different golf balls with a foamed cover layer or a foamed intermediate layer or with both a foamed cover layer and intermediate layer that can be made according to the Nesbit ‘193 patent, that are also within the ranges claimed in the ‘852 patent. For example, the three foamed golf ball examples given in the table below all anticipate the asserted claims of the ‘852 patent. Examples 1-3 have a golf ball weight of 1.62 ounces, a golf ball diameter of 1.68 inches, a cover thickness of 1.0 mm and an intermediate layer thickness of 1.0 mm.

Example	%foaming of cover layer	cover layer specific gravity	% foaming of intermediate layer	intermediate layer specific gravity	Case 1: specific gravity of core with 100% dimpled cover layer	Case 2: specific gravity of core with no dimples in the cover layer
1	0%	0.960	5.20%	0.901	1.370	1.197
2	100%	0.000	0.00%	0.950	1.361	1.361
3	100%	0.000	5.20%	0.901	1.370	1.370

The core density values for Examples 1-3 above were calculated and reported for two cases: 1) using a cover layer with no dimples and 2) using a cover layer that is composed of 100% dimples. (See Ex. 11).

<sup>3</sup> I further understand that Bridgestone has described the Nesbitt ‘193 patent as disclosing both foamed and unfoamed layers in one of its own patents. (See Ex. 10, Bridgestone Patent No. 4,919,434 at col. 2, line 65 – col.3, line 2: “The outer layer [of the Nesbitt ‘193 patent] is made of a . . . solid resin or foamed resin.”)

The three examples above were chosen because they represent the upper levels of foaming that could be used to produce golf balls that are still within the asserted claims of the '852 patent. Example 1 has only a foamed intermediate layer; 5.2% foamed. Example 2 has only a foamed cover layer; 100% foamed. Example 3 has both a foamed cover and intermediate layer foamed; 5.2% foamed intermediate layer and 100% foamed cover layer. All three of the examples above have core specific gravity values less than 1.4, regardless of the level of dimples in the cover, and all of these examples anticipate the asserted claims of the '852 patent. Examples 1-3 represent just a few examples of the many golf balls with foamed layers that can be made according to the Nesbitt '193 patent, where the core specific gravity remains below 1.4, and anticipate all the other claims of the '852 patent.

**b. U.S. Patent No. 4,431,193 to Nesbitt Anticipates Claims 6 and 7**

Nesbitt '193 discloses each and every limitation of claims 6 and 7, and therefore anticipates claims 6 and 7 of the '852 Patent. Claim 6 of the '852 patent relates to the golf ball of claim 1, and further specifies that the difference in specific gravity between the center core and the intermediate layer is in the range of 0.1 to 0.5. (Ex. 3, '852 patent, claim 6).

The Nesbitt '193 patent discloses the intermediate layer is made of Surlyn 1605, which has a specific gravity of 0.95. The specific gravity of the Nesbitt '193 core was calculated above to range from 1.156 to 1.296. Therefore, the difference between the specific gravity of the center core and the specific gravity of the intermediate layer of the golf ball disclosed in the Nesbitt '193 patent ranges from 0.21 to 0.35.

Claim 7 of the '852 patent relates to the golf ball of claim 1, discussed above, wherein the specific gravity of the intermediate layer is in the range of 0.9 to 1.0. (Ex. 3, '852 patent, claim 7). The Nesbitt '193 patent discloses the intermediate layer is made of Surlyn 1605, which has a specific gravity of 0.95. (Ex. 6). Thus, Nesbitt '193 patent discloses, expressly or inherently, each and every limitation of claims 1, 6 and 7 of the '852 patent.



**D. Opinion Regarding Invalidity of Claims 1, 6 and 7 of the '852 Patent as Obvious**

I understand that even if a claim is not anticipated by the prior art, the claim may still be rendered invalid if it is obvious in light of the prior art. When determining obviousness, more than one reference may be combined to invalidate the claim in question. When combining references, I understand that a motivation to combine the references must exist in the references themselves, or in light of the experience of one of ordinary skill in the art.

Further, when determining obviousness of a claim, I understand that secondary considerations also must be considered. I understand that the secondary considerations that have been raised by Bridgestone in this case include commercial success, licensing, copying, prior attempts and failures and obtaining unexpectedly better performance results.

**1. Combination of Prior Art References**

Claims 1, 6 and 7 of the '852 patent are obvious in light of the combination of any of: (a) the Nesbitt '193 patent; (b) U.S. Patent No. 5,314,187 ("Proudfit '187"); (c) the Wilson Ultra Tour Balata 90 Golf Ball ("UTB 90"), manufactured by Wilson Sporting Goods; (d) the Wilson Ultra Tour Balata 100 Golf Ball ("UTB 100"), manufactured by Wilson Sporting Goods; and/or the knowledge of those of ordinary skill in the art.

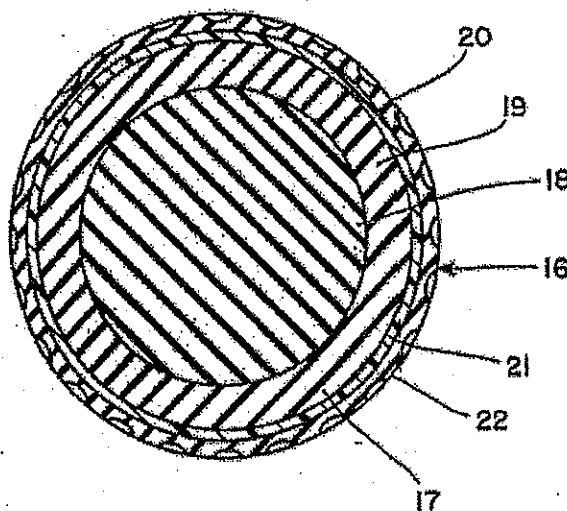
**a. Nesbitt '193**

The Nesbitt '193 patent is discussed fully earlier in this report. To the extent that any element of Nesbitt '193 is not found to be inherent from the disclosures in that patent, the '852 patent is still obvious. A person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventors (*i.e.*, improving feel and flight distance), would have been led to make the combination recited in the asserted claims of the '852 patent.

**b. Proudfit '187**

U.S. Patent No. 5,314,187 to Proudfit ("Proudfit '187") (Ex. 12) issued May 24, 1994, based on an application filed June 29, 1992. As Proudfit '187 issued as a patent more than one year before the '852 patent application was filed, I understand that Proudfit '187 is prior art. A copy of the Proudfit '187 prior art reference is attached to this report as Exhibit 12. I have reviewed the Proudfit '187 patent in light of claims 1, 6 and 7 of the '852 patent.

Proudfit '187 describes a multi-piece solid golf ball, with a solid core, an inner cover and an outer cover layer. (Ex. 12, Proudfit '187, at Abstract). The inner cover is molded over the core and the outer cover is molded over the inner cover. (Ex. 12, Proudfit '187, col. 5, lines 44-46). The inner cover is formed from a relatively hard, cut-resistant material such as ionomer resin, and the outer cover or layer is formed from relatively soft material such as natural and synthetic balata. (Ex. 12, Proudfit '187, col. 5, lines 46-51). The Proudfit '187 patent provides a golf ball which has many of the desirable features of balata covered balls ("click" and "feel") but is more durable, more cut-resistant, and easier and less expensive to manufacture. (Ex. 12, Proudfit '187, col. 5, lines 8-12). Figure 2 of the Proudfit '187 patent, reproduced below, shows a multi-piece golf ball of its invention, with a solid core (18), an inner cover (21) and an outer cover (22):

**Fig. 2**

The Proudfit '187 discloses a golf ball having a core diameter of 1.000 to 1.500 inches. (Ex. 12, Proudfit '187, at col. 7, line 35-37.) This equates to 25.4 mm to 38.1 mm. The Proudfit '187 discloses a golf ball having an inner cover diameter of 0.0250 to 0.2875 inches. (Ex. 12, Proudfit '187, at col. 7, lines 37-39.) This equates to 0.635 mm to 7.302 mm. The Proudfit '187 discloses a golf ball having an outer cover thickness of 0.0450 to 0.0650 inches. (Ex. 12, Proudfit '187, at col. 7, lines 40-42). This equates to 1.143 mm to 1.651 mm. In summary:

Layer	'852 Thickness Claim Requirements	Thickness of Layers Proudfit '187 Prior Art
Outer Cover	Between 1 – 3 mm	1.143 mm to 1.651 mm
Inner Cover	At least 1 mm	0.635 mm to 7.302 mm
Core	At least 29 mm	25.4 mm to 38.1 mm

The Proudfit '187 ball includes an inner layer formed from a relatively hard, cut-resistant material and an outer layer of soft material such as balata or a blend of balata and other elastomers. (Ex. 12, Proudfit '187, at col. 5, lines 13-17).

**c. Wilson Ultra Tour Balata 90**

The Wilson Ultra Tour Balata 90 golf balls were on sale and in use in the United States as of at least March of 1993<sup>4</sup>. Therefore, I understand that the UTB 90 golf balls are prior art to the '852 patent.

The UTB 90 golf balls appear to be the commercial embodiments of the Proudfit '187 patent, discussed above. My understanding is based on the similarities between the disclosures of the '187 patent and the properties of the UTB 90 balls we tested, 2) the fact that Wilson is the assignee of patent '187, 3) the fact that the '187 patent was filed less than 1 year before the commercial introduction of the UTB 90 golf ball to the disclosures, and 4) the "New 3 Piece Process" given in Proudfit '187 (Ex. 12, Proudfit '187, col. 10, Table 10) corresponds to my understanding of how the UTB 90 would be made.

Following my direction, engineers measured the specific gravity of the core and intermediate layer of the prior art UTB 90 golf ball. (Ex. 13). The tests were performed in accordance with a protocol that I designed, and I have personally inspected the equipment used to perform them. The specific gravity of the core of the UTB 90 ball is 1.132, which is less than 1.4 as required by claim 1 of the '852 patent. The specific gravity of the intermediate layer of the UTB 90 ball is 0.963, which is less than 1.2 and is also less than the specific gravity of the core, as required by claim 1 of the '852 patent.

The specific gravity of the intermediate layer of the UTB 90 ball (0.963) further meets the limitation of claim 7, which requires the specific gravity of the intermediate layer to be in the range of 0.9 to 1.0. The difference between the specific gravity of the center core and the intermediate layer is 0.169, which is between 0.1 to 0.5 as required by claim 6 of the '852 patent.

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<sup>4</sup> Per Jeff Dalton at Acushnet, there is an entry in Acushnet's Competitive Ball Database that shows a sample of these balls was logged in on 3/5/93 (log # 93007).

At my direction, the hardness of the intermediate layer of the prior art UTB golf ball was measured and found to range between 86.6 to 89.7 on the JIS C scale, which is greater than 85 as required by claim 1 of the '852 patent. (Ex. 13).

At my direction, the thicknesses of the outer cover and intermediate layer of the UTB 90 prior art golf ball were measured. The thickness of the outer cover ranged from 1.27 mm to 1.35 mm, which is within the claimed range of 1 -3 mm, as required by claim 1 of the '852 patent. (Ex. 13).

The thickness of the intermediate layer ranged from 0.66 mm to 0.76 mm. (Ex. 13). Claim 1 of the '852 patent requires that the intermediate layer have a thickness of at least 1 mm. Although the testing of the Wilson UTB 90 prior art balls show an intermediate layer less than 1.0 mm, the patent covering the UTB 90 ball, the Proudfit '187 patent, discloses that the intermediate layer can range up to 7 mm.

Thus, the construction of the Wilson UTB 90 golf ball that includes the variation disclosed in the Proudfit '187 patent to the intermediate layer thickness, such that the intermediate layer thickness is greater than 1 mm, would possess all of the claimed limitations of the asserted claims of the '852 patent. It is my opinion, therefore, that claims 1, 6 and 7 of the '852 patent are made obvious by combining the disclosures of the Proudfit '187 patent, discussed above, with the inherent characteristics of its commercial embodiment (i.e., the UTB 90 golf ball) and/or the knowledge of one of ordinary skill in the art at the time of the '852 invention.

## **2. Motivation to Combine Prior Art References**

Each of claim 1, 6 and 7 of the '852 patent is obvious by the combination of two or more of (a) the Nesbitt '193 patent; (b) U.S. Patent No. 5,314,187 ("Proudfit '187"); (c) the Wilson Ultra Tour Balata 90 Golf Ball ("UTB 90"), manufactured by Wilson Sporting Goods; (d) the Wilson Ultra Tour Balata 100 Golf Ball ("UTB 100"), manufactured by Wilson Sporting Goods; and/or (e) the knowledge of those of ordinary skill in the art.

Each reference is generally directed to the same problem of improving the “feel” and “durability” of golf balls without sacrificing flying performance. Further, each reference is generally directed to a multi-piece golf ball with prescribed materials and thicknesses for the core, the intermediate or inner cover layer and the outer cover.

With respect to the Nesbitt ‘193 patent, motivation to combine is provided by the prior art reference itself, the knowledge of one of ordinary skill in the art and what the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. The Nesbitt ‘193 reference is directed to improving the “feel” of a golf ball without sacrificing the flying performance. (Ex. 5, Nesbitt ‘193, col. 1, line 65 – col. 2, line 9: “The three-piece golf ball of the invention provides a golf ball in which ... the playing characteristics or ‘feel’ associated with a balata covered ball [are] secured ... without sacrificing any advantages of a golf ball having a standard Surlyn cover of the prior art ball...”).

The Nesbitt ‘193 obtains this goal through an improved method of making a three-piece golf ball with prescribed materials and thicknesses for the solid core, the inner cover layer and the outer cover layer, (Ex. 5, Nesbitt ‘193, col. Abstract; col. 1, line 35 – col. 2, line 9; col. 3, lines 16-25), in which, the inner cover is made of a hard resinous material, such as Surlyn 1605, while the outer cover is made of a comparably softer resin, such as Surlyn 1855. (Ex. 5, Nesbitt ‘193, col. 3, lines 16-25).

One skilled in the art can derive the specific gravity and exact hardness properties of the disclosed materials in the Nesbitt ‘193 patent by using basic geometry and looking up established scientific properties of the materials. These tasks were easily within the skill of one in the art at the time of the ‘852 invention. Therefore, combining the Nesbitt ‘193 patent with the knowledge of those of ordinary skill in the art makes the claims of the ‘852 patent obvious.

With respect to combining the Proudfit ‘187 and UTB 90/100 golf balls, the motivation to combine is similarly provided by the references themselves, the knowledge of one of ordinary skill in the art and what the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. The Proudfit ‘187 patent, discussed above, describes a golf

ball with an improved cover with prescribed thicknesses for the solid core, the inner layer and the outer cover layer, (Ex. 12, Proudfit '187, col. 7, lines 35-46), to result in a golf ball with improved durability. (Ex. 12, Proudfit '187, col. 5, lines 8-11: "The invention provides a golf ball which has many of the desirable features of balata covered balls but is more durable, more cut-resistant, and easier and less expensive to manufacture than conventional balata covered balls.")

The UTB 90/100 ball is the commercial embodiment of the Proudfit '187 patent, and therefore, is solving the same problems as the invention disclosed in the Proudfit '187 patent. Therefore, one of ordinary skill in the art would immediately be motivated to combine the characteristics of the UTB ball with the Proudfit '187 patent.

## VI. U.S. PATENT NO. 5,743,817

### A. The Disclosure of the '817 Patent

The '817 patent issued to Hisashi Yamagishi, Yoshinori Egashira, and Hideo Watanabe on April 28, 1998. The inventors intended to invent a two-piece golf ball that provided the good flight control of a wound golf ball while maintaining the distance benefit of solid core golf balls. (Ex. 15, Watanabe 8/24/06 Dep. at 55:16-57:3; 58:13-59:19). They sought to provide those advantages by controlling the thickness and hardness of the cover and finding an "optimal balance" between the distortion of the core and the distortion of the ball. (Ex. 15, Watanabe 8/24/06 Dep. at 63:20-64:15; 66:6-11).

The '817 patent pertains to golf balls that allegedly exhibit improved feel, spin properties and iron control "without detracting from the trajectory and flying distance inherent to the solid golf ball." (Ex. 16, '817 patent at col. 1, lines 28-33). The purpose was to combine control – a performance benefit of traditional wound golf balls – with the increased distance off the tee that is generally attributable to solid core golf balls. (Ex. 17, Egashira 9/29/06 Dep. at 81:10-82:6).

The patent covers solid golf balls having a core and a cover enclosing the core. (Ex. 16, '817 patent at col. 1, lines 34-36). Claim 1, the only asserted claim, reads:

A golf ball comprising a core and a cover wherein said core and said ball has a core hardness and a ball hardness respectively, wherein said core has a distortion of 2.9 to 4.0 mm under a load of 100 kg, the ratio of a core distortion under a load of 100 kg divided by a ball distortion under a load of 100 kg ranges from 1.0 to 1.3, and said cover consists of an ionomer resin as a resin component and has a thickness of 1.3 to 1.8 mm and a Shore D hardness of up to 60.

(Ex. 16, '817 patent at col. 6, lines 48-56).

#### **B. The Japanese Priority Documents**

Bridgestone filed the United States application on September 29, 1995, claiming priority to two Japanese applications – one filed on October 14, 1994 and the second filed on December 14, 1994.

In the October 1994 Japanese application, the inventors initially claimed (1) a core distortion of at least 2.2 mm under a 100 kg load, (2) a range of core distortion divided by ball distortion of 1.0-1.3, and (3) a cover thickness of 1.3-2.4 mm. (See Ex. 18, BSP 242814-242830). As early as March 14, 1994, however, Bridgestone manufactured and sold the Precept EV Extra Spin golf ball in the United States. (See Ex. 19, AB 4601-4602). The Precept EV Extra Spin met every limitation of the October 1994 application – it (1) had a core distortion of 2.9, (2) a ball distortion of 2.79, providing a ratio of core distortion divided by ball distortion of 1.1, and (3) a cover thickness of 2.0 mm. (See Ex. 20, BSP 89622-26; Ex. 21, Watanabe 8/25/06 Dep. at 166:16-175:22). Thus, the Precept EV Extra Spin golf ball would have anticipated claim 1 of the '817 patent as it was originally drafted in the October 1994 Japanese application.

In the revised Japanese application filed in December 1994, the inventors reduced their claimed cover thickness range to 1.3-1.8 mm. (Ex. 22, Appl. No. 6-333024 at 1). As that was the only change between the two applications, the inventors conceivably reduced the claimed cover thickness in order to preclude anticipation by the prior art Precept EV Extra Spin golf ball. When filed in the United States, the '817 patent application claimed the narrower range of cover thickness from the December 1994 application.



### C. The Prosecution History

The application that matured into the '817 patent was filed in the United States Patent and Trademark Office on September 29, 1995. The patent examiner initially rejected all three claims as anticipated and/or obvious over a number of references, including Bridgestone's own British patent application GB 2 276 628 ("GB '628"). (Ex. 23, Sep. 3, 1996 Office Action at 3-4). In doing so, the examiner stated

As understood, only inherent features of the reference golf balls are claimed. Any possible distinctions over said golf balls are deemed obvious arbitrary variants thereof, simply to provide comparative examples.

(*Id.* at 3). The examiner specifically addressed the claimed ratio of core distortion by ball distortion (initially claimed as core *hardness* divided by ball *hardness* – in the context of the core and ball measurements of the '817 patent, "hardness" and "distortion" are synonymous terms that refer to the deformation of the core and/or ball under a 100 kg load). The examiner stated that "since no prior art publication has heretofore disclosed a hardness ratio of the core hardness divided by ball hardness, the invention cannot be properly searched." (*Id.* at 2).

In response to the examiner's rejection, Bridgestone amended its application. Among other things, it changed the core distortion requirement from "at least 2.2 mm" to "a distortion of 2.9 to 4.0 mm," added the requirements that the cover (1) "consist of an ionomer resin as a resin component" and have (2) "a Shore D hardness of up to 60." (Ex. 23, March 4, 1997 Amendment at 1).

In addition, Bridgestone distinguished the '817 patent application from GB '628. In its argument to the patent examiner, Bridgestone stated that the British reference

fails to disclose the combination of the cover thickness and the core distortion of the present golf ball. The cover thickness of [GB '628] is 2.0 mm and the core distortion is 2.51 to 2.71 (see Examples) which do not fall within the presently claimed range.

Furthermore, as the core distortion increases the core becomes softer. The present core distortion of 2.9 to 4.0 mm under a load of 100 kg means that the core is very soft. Also, the present cover hardness is up to 60 on Shore D and thus is not hard. In general, the combination of a softer core and a softer cover results in low repulsion, i.e., an inferior flying distance. In the present golf ball, since the cover

thickness is 1.3 to 1.8 mm which is thin and the ratio of core distortion/ball distortion is 1.0 to 1.3, a flying distance as well, as stop on the green, are good regardless of the combination of a soft core and cover. This feature of the present invention is not disclosed or taught by [GB '628], as well as the other references.

(*Id.* at 7).

On April 24, 1997, the examiner allowed the three claims of the '817 patent. (Ex. 23, Apr. 24, 1997 Office Action at 1).

#### **D. The '817 Patent Is Very Narrow**

Because the '817 patent is markedly similar to the prior art Bridgestone Precept EV Extra Spin golf ball, its scope was very narrow from its inception. As noted above, the manufacturing specifications for the Precept EV Extra Spin golf ball show that it embodied every property of the originally-filed Japanese application. Even as filed in the United States, the '817 patent differs only slightly from that golf ball as shown from Bridgestone's own manufacturing specifications for the ball:

- Claim 1 of the '817 patent requires a core distortion of 2.9 to 4.0 mm under a load of 100 kg – the Precept EV Extra Spin has a core distortion of 2.9 mm under a load of 100 kg (*see* Ex. 20, BSP 89622-26);
- Claim 1 of the '817 patent requires the ratio of core distortion under a load of 100 kg divided by ball distortion under a load of 100 kg to be between 1.0 and 1.3 – the Precept EV Extra Spin has a ball distortion of 2.79 under a load of 100 kg, so that the ratio of its core distortion (2.9 mm) divided by its ball distortion (2.79 mm) is 1.1 (*see* Ex. 20, BSP 89622-26);
- Claim 1 of the '817 patent requires that the cover consist of an ionomer resin as a resin component – the cover of the Precept EV Extra Spin was made from Surlyn 7930, which is an ionomer resin (*see* Ex. 20, BSP 89622-26); and

- Claim 1 of the '817 patent requires that the cover have a Shore D hardness of up to 60 – the Precept EV Extra Spin has a Shore D hardness of 52 (*see* Ex. 20, BSP 89622-26).

The only difference between Claim 1 of the '817 patent and the Precept EV Extra Spin is in cover thickness. Claim 1 requires that the cover have a thickness of 1.3 to 1.8 mm, whereas the Precept EV Extra Spin had a cover thickness of 2.0 mm – a difference of only 0.2 mm. (*See* Ex. 20, BSP 89622-26). Recent testing of Precept EV Extra Spin golf balls sold in the United States in March of 1994 and obtained by Acushnet at that time confirms that those manufacturing targets were implemented in the golf balls sold in the United States at that time. (*See* Exhibit 24). Thus, Bridgestone's own Precept EV Extra Spin comes literally within 0.2 mm of anticipating the '817 patent.

Interestingly, despite the similarity of Bridgestone's Precept EV Extra Spin golf ball to claim 1 of the '817 patent – and its anticipation of the originally-filed Japanese priority document – Bridgestone never disclosed the existence of that ball to the examiner. Bridgestone filed a single information disclosure statement during the prosecution of the '817 patent, in which it identified only three prior art patents and no golf balls. (*See* Ex. 23, Apr. 12, 1996 Information Disclosure Statement).

**E. The '817 Patent Is Anticipated By Japanese Kokai Publication No. 60-163673**

I have concluded that claim 1 is invalid as anticipated by Bridgestone's own Japanese Kokai Publication No. 60-163673 ("JP '673") (Ex. 25).

The Japanese Patent Office published JP '673 on August 26, 1985, close to ten years before Bridgestone's earliest claimed foreign filing date of October 14, 1994. The unexamined application was filed by Bridgestone Corporation and names Tetsuya Shima and Michitsugu Kikuchi as the inventors. By predating the October 14, 1994 priority date claimed by Bridgestone for the '817 patent, I understand that JP '673 qualifies as prior art.

Despite the fact that JP '673 predates the '817 patent by almost ten years, the two disclosures are remarkably similar. Like the '817 patent, the disclosure of JP '673 is directed, in part, to "improved hitting feel" in solid core golf balls. (Ex. 25, JP '673 at 400). Also like the '817 patent, the named inventors on JP '673 sought to improve feel by controlling (1) the hardness of the solid core (as measured by distortion of the core under a 100 kg load) and (2) the thickness of the cover:

by combining a solid core having the hardness of the above-described range and a cover having a flexural modulus and thickness in the foregoing range, the golf ball unexpectedly exhibited soft hitting feel but did not reduce durability or initial velocity.

Then, the inventors concluded that the golf ball having the equivalent hitting feel to that of a thread-wound ball was obtained when specifying the combination of the hardness of the core and the flexural modulus and thickness of the cover.

(Ex. 25, JP '673 at 400).

The golf balls taught by both JP '673 and the '817 patent are very similar. Both teach a core made from 100 parts by weight of a cis-1,4 polybutadiene rubber, an unsaturated acid such as acrylic acid, dicumyl peroxide, and zinc oxide. (See Ex. 25, JP '673 at 401; Ex. 16, '817 Patent at Col. 3, ll. 42-45). Further, they both teach covers made from ionomeric resins. (See Ex. 25, JP '673 at 401, Tables 1-4; Ex. 16, '817 patent at col. 4, lines 44-52, Table 2).

In fact, JP '673 expressly discloses core distortions and cover thickness that are claimed by the '817 patent. For example, JP '673 provides a table – Table 4 – that lists examples of its invention with core distortions ranging from 3.3 to 3.7 mm under a load of 100 kg, which is entirely within the range of 2.9 to 4.0 claimed by the '817 patent. (Ex. 25, JP '673 at Table 4). The second identified example has a cover thickness of 1.75 mm, which is within the range of 1.3 to 1.8 claimed by the '817 patent. (Ex. 25, JP '673 at Table 4).

JP '673 does not explicitly disclose the ratio of core distortion divided by ball distortion, or the Shore D hardness of the cover. As will be shown below, however, those two properties

are inherent to the examples provided in Table 4 of JP '673. JP '673, therefore, teaches every limitation from claim 1 of the '817 patent.

1. **"A golf ball comprising a core and a cover wherein said core and said ball has a core hardness and a ball hardness respectively"**

Table 4 of JP '673 discloses golf balls with cores and covers. (Ex. 25, JP '673 at Table

4). Thus, I conclude that JP '673 discloses this limitation.

2. **"wherein said core has a distortion of 2.9 to 4.0 mm under a load of 100 kg"**

Table 4 discloses cores with a range of distortions from 3.3 mm to 3.7 mm under a 100 kg load. (Ex. 25, JP '673 at 399, Table 4). That range is entirely within the range claimed by the '817 patent. Thus, I conclude that JP '673 discloses this limitation.

3. **"the ratio of a core distortion under a load of 100 kg divided by a ball distortion under a load of 100 kg ranges from 1.0 to 1.3"**

While JP '673 does not expressly disclose a ball distortion under a load of 100 kg, this limitation is inherent in the golf ball examples shown in Table 4. Specifically, JP '673 teaches how to construct a golf ball:

Solid cores were prepared by combining 100 parts by weight of a polybutadiene, 20 to 80 parts by weight of zinc oxide, 10 to 30 parts of acrylic acid and 0.5 to 4 parts by weight of dicumylperoxide, milling the compositions in a 1000 $\alpha$  Banbury mixer and a roll mill, and compression molding them at 150°C for 40 minutes. Solid cores were prepared so that the diameters range 36 to 40mm and deformations range 2.0 to 3.5mm under a constant load of 100kg.

Cover compositions containing 100 parts by weight of an ionomer resin and 20 parts by weight of titanium dioxide were injection molded over the above-described solid cores to form two-piece golf balls comprising covers having the flexural modulus and thickness as shown in Table 1 to Table 4 through Table 4. As ionomer resins, resins were chosen from Himilan® having various flexural modulus. (The product numbers of Himilan® used for Table 1 to Table 4 are noted in the table.) Table 1 shows the results when the solid core has a deformation of 1.8 to 2.2mm under a constant load of 100kg, Table 3 when the solid core has a deformation of 2.8 to 3.2mm under a constant load of 100kg and

Table 4 when the solid core has a deformation of 3.3 to 3.7mm under a constant load of 100kg.

(Ex. 25, JP '673 at 401).

Acting under my supervision, Acushnet employees used those teachings to construct golf ball cores with (a) a range of core diameters (36 mm to 40 mm) disclosed in the specification and (b) distortions from 3.3 mm to 3.7 mm under a 100 kg load, as disclosed in Table 4. (JP '673 at 399, Table 4). For the cover, they used a 1.75 mm thick blend of Himilan 1855 and titanium dioxide from Table 4.

#### a. Core Composition

As noted above, the specification teaches a composition "... containing 100 parts by weight of a polybutadiene containing 1-4 cis-bond, 10 to 30 parts by weight of acrylic and/or methacrylic acid, 10 to 70 parts by weight of zinc oxide, and 0.5 to 6 parts by weight of peroxide ...." The specification also teaches the use of metallic salts of unsaturated carboxylic acids (i.e. acrylic and methacrylic acids) and so zinc diacrylate (ZDA) was used in the formulas in place of acrylic acid. The stoichiometric equivalent of the formulation taught in the specification using zinc diacrylate is as follows:

- 100 parts of polybutadiene containing 1-4 cis-bond
- 14.4 to 43.2 parts of ZDA
- 4.4 to 64.4 parts of zinc oxide (compensating for the zinc oxide used to form ZDA)
- 0.5 to 6 parts of peroxide

The actual recipes used to make the four cores used in this experiment were:

#### **Sample Set No. 1: 36 mm diameter core, distortion of 3.3 mm @ 100 kg**

- 100 parts of polybutadiene (Dow BR 1220)
- 25 parts of ZDA
- 5 parts of zinc oxide
- 0.5 parts of peroxide (Trigonox 265)
- 0.2 parts orange color masterbatch
- 18 parts Barium Sulfate (Polywate 325)

#### **Sample Set No. 2: 36 mm diameter, distortion of 3.7 mm @ 100 kg**

- 100 parts of polybutadiene (37 parts Bayer CB23 & 63 parts Dow BR 1220)
- 23 parts of ZDA
- 5 parts of zinc oxide
- 0.6 parts of peroxide (Trigonox 265)
- 0.2 parts yellow color masterbatch
- 19 parts Barium Sulfate (Polywate 325)
- 3 parts Aktiplast PP

**Sample Set No. 3: 40 mm diameter, distortion of 3.3 mm @ 100 kg**

- 100 parts of polybutadiene (Dow BR 1220)
- 25 parts of ZDA
- 5 parts of zinc oxide
- 0.5 parts of peroxide (Trigonox 265)
- 0.2 parts orange color masterbatch
- 18 parts Barium Sulfate (Polywate 325)

**Sample Set No. 4: 40 mm diameter, distortion of 3.7 mm @ 100 kg**

- 100 parts of polybutadiene (88 parts Bayer CB23 & 12 parts Dow 1220)
- 22 parts of ZDA
- 21 parts of zinc oxide
- 0.5 parts of peroxide (Trigonox 265)
- 0.6 parts blue color masterbatch
- 0.2 parts black color masterbatch
- 1 part Aflux 16

**b. Core Molding**

The cores were molded in a compression mold at 335° F for 11 minutes. The cores were molded in molds that were slightly larger than the desired core diameter and then ground to the desired size using a centerless grinding machine. The final diameters are listed below.

Distortion @ 100 kg was measured of an MTS compression/tensile tester Model Sintech 5/G, using an MTS load cell model 4501011/8 rated at 2000 N. The distortion test was performed at a crosshead speed of 25.4 mm/min (1 inch/min).

**Sample Set No. 1: 36 mm, distortion of 3.3 mm @ 100 kg**

Sample	Core Diameter	Core Distortion at 100 kg
Core 1	36 mm	3.3 mm
Core 2	36 mm	3.3 mm
Core 3	36 mm	3.3 mm
Core 4	36 mm	3.3 mm
Core 5	36 mm	3.3 mm
Core 6	36 mm	3.3 mm

**Sample Set No. 2: 36 mm, distortion of 3.7 mm @ 100 kg**

Sample	Core Diameter	Core Distortion at 100 kg
Core 1	36 mm	3.7 mm
Core 2	36 mm	3.7 mm
Core 3	36 mm	3.7 mm
Core 4	36 mm	3.7 mm
Core 5	36 mm	3.7 mm
Core 6	36 mm	3.7 mm

**Sample Set No. 3: 40 mm, distortion of 3.3 mm @ 100 kg**

Sample	Core Diameter	Core Distortion at 100 kg
Core 1	40.3 mm	3.3 mm
Core 2	40.3 mm	3.2 mm
Core 3	40.3 mm	3.2 mm
Core 4	40.3 mm	3.2 mm
Core 5	40.3 mm	3.2 mm
Core 6	40.3 mm	3.3 mm

**Sample Set No. 4: 40 mm, deformation of 3.7 mm @ 100 kg**

Sample	Core Diameter	Core Distortion at 100 kg
Core 1	40.2 mm	3.7 mm
Core 2	40.2 mm	3.7 mm
Core 3	40.2 mm	3.7 mm
Core 4	40.2 mm	3.7 mm
Core 5	40.2 mm	3.7 mm
Core 6	40.2 mm	3.7 mm



**c. Cover Material Formulation**

As noted above, the reference teaches cover compositions containing 100 parts by weight of an ionomer resin and 20 parts by weight of titanium dioxide. Further, Table 4 teaches Himilan 1855 as an example of ionomer resin. We made the blend of 20 parts titanium dioxide in 100 parts of Himilan 1855 using a Werner & Pfleiderer Twin Screw Compounder type ZSK-30. The cover material was injection molded into half shells for compression molding around the sample cores. Half shells were made in two sizes to mold onto the two different core diameters. A 2-inch diameter sample disc was compression molded to measure Shore D hardness. The hardness was measured 4 days after molding. The Shore D hardness was 51.0 (average of 5 measurements, 51.0, 50.8, 50.6, 50.3, 52.4). While I understand that Shore D hardness may change within two weeks of molding, it will not increase by more than a few Shore D points, so I would expect the measurements at two weeks to be under 60.

**d. Cover Molding**

Covers were compression molded onto the four sample sets. In all cases a cover thickness of 1.75 mm was achieved. The two 36 mm core types were cover molded in a 41 mm mold and ground in a centerless grinding machine to the desired diameter of 39.5 mm. The two 40 mm core types were cover molded in a 43.8 mm mold.

**e. Ball Properties**

The diameter, 100 kg distortion, and cover hardness of the molded balls were measured. The data is below.

**Sample Set No. 1:**

Sample	Ball Diameter	Cover Thickness	100 kg Distortion	Core Distortion/Ball Distortion	Cover Shore D Hardness
Ball 1	39.5 mm	1.75 mm	3.0 mm	1.10	53.8
Ball 2	39.5 mm	1.75 mm	3.0 mm	1.10	54.5
Ball 3	39.5 mm	1.75 mm	3.1 mm	1.06	55.0
Ball 4	39.5 mm	1.75 mm	3.0 mm	1.10	55.2
Ball 5	39.5 mm	1.75 mm	3.0 mm	1.10	54.7
Ball 6	39.5 mm	1.75 mm	3.0 mm	1.10	55.0

**Sample Set No. 2:**

Sample	Ball Diameter	Cover Thickness	100 kg Distortion	Core Distortion/Ball Distortion	Cover Shore D Hardness
Ball 1	39.5 mm	1.75 mm	3.4 mm	1.09	54.4
Ball 2	39.5 mm	1.75 mm	3.4 mm	1.09	54.9
Ball 3	39.5 mm	1.75 mm	3.4 mm	1.09	54.6
Ball 4	39.5 mm	1.75 mm	3.4 mm	1.09	54.0
Ball 5	39.5 mm	1.75 mm	3.4 mm	1.09	54.5
Ball 6	39.5 mm	1.75 mm	3.4 mm	1.09	54.8

**Sample Set No. 3:**

Sample	Ball Diameter	Cover Thickness	100 kg Distortion	Core Distortion/Ball Distortion	Cover Shore D Hardness
Ball 1	43.8 mm	1.75 mm	3.1 mm	1.06	51.5
Ball 2	43.8 mm	1.75 mm	3.1 mm	1.03	51.0
Ball 3	43.8 mm	1.75 mm	3.1 mm	1.03	51.9
Ball 4	43.8 mm	1.75 mm	3.0 mm	1.07	50.2
Ball 5	43.8 mm	1.75 mm	3.0 mm	1.07	52.2
Ball 6	43.8 mm	1.75 mm	3.1 mm	1.06	52.1

**Sample Set No. 4:**

Sample	Ball Diameter	Cover Thickness	100 kg Distortion	Core Distortion/Ball Distortion	Cover Shore D Hardness
Ball 1	43.7 mm	1.75 mm	3.6 mm	1.03	49.8
Ball 2	43.7 mm	1.75 mm	3.6 mm	1.06	49.2
Ball 3	43.7 mm	1.75 mm	3.6 mm	1.03	49.5
Ball 4	43.7 mm	1.75 mm	3.6 mm	1.03	49.5
Ball 5	43.7 mm	1.75 mm	3.6 mm	1.06	49.6
Ball 6	43.7 mm	1.75 mm	3.6 mm	1.06	49.2

Based on that data, I conclude that the examples in Table 4 of JP '673 inherently disclose this limitation.

The results of my tests were not surprising. The ratio of core distortion divided by ball distortion is neither a new concept nor was it invented by Bridgestone. All solid golf balls inherently have a ratio of core distortion divided by ball distortion. The ratio claimed by the '817 patent – 1.0 to 1.3 – means only that the golf ball, which consists of a core plus a cover, is

going to have the same or slightly less deflection under a 100 kg load than the deflection of the core alone.<sup>5</sup>

The claimed ratio is self-evident when one considers the structure of the golf balls such as those taught by the '817 patent. As acknowledged by Bridgestone during prosecution, the '817 patent claims a soft core. (Ex. 23, Mar. 4, 1997 Amendment at 7) ("The present core distortion of 2.9 to 4.0 mm under a load of 100 kg means that the present core is very soft."). The cover material claimed by the '817 patent is a soft ionomer resin, but would be expected to reduce the core distortion. In fact, one of the primary reasons for putting the ionomer cover on the core is to reduce the distortion of the core at club impact. Thus, when you cover a soft core with an ionomer, the ball necessarily will deflect by either the same amount or slightly less than the core alone. As a result, the ratio of core distortion divided by ball distortion will be either 1 (when the distortion of the ball is the same as the core) or slightly greater than 1 (when the distortion of the ball is slightly less than the distortion of the core). Further, the cover taught by the '817 patent is a relatively thin. (See Ex. 23, Mar. 4, 1997 Amendment at 7) ("the cover thickness is 1.3 to 1.8 mm which is thin"). With a thin cover, such as the 1.75 mm cover disclosed in Table 4 of JP '673, the effect on ball distortion will be even less, so that the ratio will be closer to 1.

For example, the Precept EV Extra Spin provides an example of the ratio. As shown above, the Precept EV Extra Spin golf ball used the same basic core and cover as those taught by the '817. The one exception is that the cover of the Precept EV Extra Spin is 2.0 mm – 0.2 mm outside the range claimed by the '817 patent. If anything, one would expect the thicker cover to decrease the ball's distortion relative to the core distortion and drive the ratio higher. Nevertheless, the ratio for the Precept EV Extra Spin was only 1.1, well within the claimed range. (See Ex. 24).

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<sup>5</sup> Note that even a one-piece golf ball would fall within the claimed range. In that case, the core and the ball are the same, and thus have the same distortion. As a result, the ratio of core distortion divided by ball distortion would be a number divided by itself, which is 1.

Yet another such example is provided by GB '628. GB '628 discloses an example of a control core with a core distortion of 2.61 mm. (Ex. 26, GB '628 at 15). It further discloses golf balls with distortions under a 100 kg load of 2.39 mm to 2.57 mm, made from the same list of ingredients and in the same amounts as the control core. (Ex. 26, GB '628 at 10, 14). By dividing the control core distortion by the disclosed ball distortions, GB '628 teaches a ratio of 1.01 to 1.09. The lower value is the control core distortion of 2.61 mm divided by a ball distortion of 2.57 mm, while the higher value is the control core distortion of 2.61 mm divided by the ball distortion of 2.39 mm. The range of distortion ratios taught by GB '628 is quite narrow and entirely within the range claimed by the '817 patent.

As demonstrated by the above examples, the claimed distortion ratio is not novel and was not invented in the '817 patent. JP '673, the Precept EV Extra Spin, and GB '628 – all from Bridgestone – all possessed the claimed ratio property before it was taught by the '817 patent and all have ratios slightly greater than 1 and well under 1.3.

In my experience manufacturing golf balls and in the experience of the golf ball manufacturers to whom I have spoken, it is generally understood that the addition of an ionomer cover to a core will decrease the distortion of the golf ball. The basic physics of golf balls dictate that a soft core covered by an ionomer cover will have a distortion under a 100 kg load that is either the same or slightly less than the distortion of the core itself, resulting in a distortion ratio that is 1 or slightly greater than 1.

**4. “said cover consists of an ionomer resin as a resin component”**

As noted above, Table 4 of JP '673 discloses the use of Himilan 1856 and 1855 in the cover. (Ex. 25, JP '673 at 401, Table 4). Himilan® is the trade name for a family of ionomer resins manufactured in Japan by DuPont-Mitsui Polychemical Co., Ltd., which are equivalent to the Surlyn® family of ionomer resins manufactured in the United States by DuPont. While I understand that the parties dispute whether this limitation in the '817 patent allows blends of ionomer resins as the resin component, there is no dispute that this limitation is met by a cover

whose resin component is comprised of a single ionomer resin, as shown in Table 4. Thus, I conclude that JP '673 discloses this limitation under either party's proposed claim construction.

5. "said cover ... has a thickness of 1.3 to 1.8 mm"

As discussed above, Table 4 of JP '673 discloses specific examples with cover thicknesses of 1.75 mm on golf balls that also meet the other limitations of claim 1 of the '817 patent. (Ex. 25, JP '673 at Tables 1-4). Thus, I conclude that JP '673 discloses this limitation.

6. "said cover ... has ... a Shore D hardness of up to 60"

I understand the limitation "said cover ... has ... a Shore D hardness of up to 60" to mean that the hardness of the cover *on the ball* as measured with a Shore D durometer must be 60 or less. I understand that Bridgestone, however, has taken the position that the cover Shore D hardness refers to the hardness of the cover material, as measured by forming a plaque or button of the cover material and then measuring that plaque or button with a Shore D durometer pursuant to ASTM Standard D 2240. Under either method, I conclude that JP '673 discloses this limitation.

Because JP '673 is silent as to the Shore D hardness of the cover as measured on the ball, I again relied on physical golf balls constructed according to the teachings of JP '673 as described above. JP '673 states that

Cover compositions containing 100 parts by weight of an ionomer resin and 20 parts by weight of titanium dioxide were injection molded over the above-described solid cores to form two-piece golf balls comprising covers having the flexural modulus and thickness as shown in Table 1 through Table 4. As ionomer resins, resins were chosen from Himilan® having various flexural modulus. (The product numbers of Himilan® used for Table 1 to Table 4 are noted in the table.).

(Ex. 25, JP '673 at 401). Following that teaching, I constructed two separate covers using 100 parts by weight each of Himilan 1856 and Himilan 1855 as the ionomer resin as shown in Table 4. The covers also included 20 parts by weight of titanium dioxide. Relying on Table 4, I used a thickness of 1.75 mm for the covers. I then placed each individual golf ball into a Shore D durometer as described above and acquired a Shore D measurement for each ball. Each result

was less than 60, as shown above. Thus, although JP '673 does not explicitly disclose a Shore D cover hardness within the claimed range as measured on the ball, that property is inherent to the examples in Table 4 using Himilan 1855.

That limitation is also inherent under Bridgestone's proposed Shore D measurement method. In addition to measuring the cover hardness on the ball, I formed plaques of the cover compositions described above using Himilan 1855 and measured them with a Shore D durometer according to ASTM Standard D 2240. Again, the result was less than 60 for each sample, as shown above. Thus, I conclude that this limitation is inherently disclosed by JP '673.

Based on the foregoing analysis, I conclude that JP '673 invalidates claim 1 of the '817 patent.

**F. Alternatively, The '817 Patent Is Invalid As Obvious In Light Of JP '673**

The only limitations from the '817 patent not explicitly taught by JP '673 are (1) the claimed ratio of core distortion divided by ball distortion and (2) the Shore D hardness of the cover. As shown above, however, those limitations were neither novel nor invented by Bridgestone – golf balls constructed from Table 4 of JP '673 meet those limitations, as do Bridgestone's Precept EV Extra Spin golf ball and the golf balls taught in Bridgestone's GB '628 reference. Even if JP '673 did not inherently disclose those limitations, however, it would have been obvious to one of ordinary skill in the art.

**1. The Claimed Ratio Of Core Distortion Divided By Ball Distortion Would Have Been Obvious To One Of Ordinary Skill In The Art**

As shown by Bridgestone's own Precept EV Extra Spin golf ball and GB '628 reference, the basic physics of placing thin ionomer cover over a soft core dictate that the ball will distort slightly less than the core alone, due to the restraining effect of the cover layer on the core. Thus, any ratio of core distortion divided by ball distortion for such a construction would be either 1 (where the ball distortion and core distortion are the same) or slightly greater than 1

(where the ball distortion is slightly less than the core distortion). Through an understanding of the basic physics of ball construction and/or knowledge of the Precept EV Extra Spin golf ball, one of ordinary skill in the art of golf ball manufacturing would appreciate that the ratio of core distortion divided by ball distortion should be between 1.0 and 1.3, as they did for the similar constructions used by the Precept EV Extra Spin golf ball and in the GB '628 publication.

**2. The Claimed Range of Shore D Hardness Would Have Been Obvious To One Of Ordinary Skill In The Art**

As further shown by Bridgestone's own Precept EV Extra Spin golf ball, it would have been obvious to use a cover with a Shore D hardness of up to 60 with a soft core construction. The soft core is designed to improve feel; a cover with a Shore D hardness of up to 60 contributes to the feel, whereas a harder cover would detract from it. This fact was recognized in the Precept EV Extra Spin, which used a cover with a Shore D hardness of 52.

**VII. THE '707, '834, AND '791 PATENTS**

**A. Overview of the Patents**

I will now address three related Bridgestone patents: U.S. Patent No. 5,782,707 (the '707 Patent) (Ex. 25), U.S. Patent No. 5,803,834 (the '834 Patent) (Ex. 26) and U.S. Patent No. 6,6791,791 (the '791 Patent) (Ex. 27). These three patents claim golf balls having a core with a surface harder than the center, where the hardness of the core increases radially outward from the center, sometimes increasing by a specific amount. This feature is referred to in the art as a hardness gradient in the core. In particular, a core's "hardness gradient" is a measurement of how the hardness of the core's rubber changes from the center of the core to its surface.

**1. The '707 Patent**

The '707 patent, entitled a "Three-Piece Solid Golf Ball," was applied for at the PTO on March 10, 1997, claiming priority to Japanese patent application no. 8-082121, filed March 11, 1996. The PTO issued the '707 Patent to Bridgestone on July 21, 1998, naming as the inventors Hisashi Yamagishi and Hiroshi Higuchi. The claims of the '707 are directed to the following



combination of three elements: (1) a core with a particular hardness distribution, whose key feature is a hardness gradient of 8-20 degrees, (2) a three-piece structure with a hard intermediate layer between the core and soft cover, and (3) dimple coverage of at least 62%.

## 2. The '834 Patent

The '834 patent, entitled a "Two-Piece Golf Ball," was applied for at the PTO on February 27, 1997, claiming priority to Japanese patent application no. 8-071135, filed March 1, 1996. On September 8, 1998, the PTO issued the '834 Patent to Bridgestone. The patent names Hisashi Yamagishi and Jun Shindo as the inventors. This patent generally claims the combination of: (1) a core with a particular hardness profile, whose key features are a hardness gradient of 8-20, and a relatively consistent hardness within the outer 5mm of the core, (2) a two piece structure with a hardness difference between the core and the cover, and a specified cover thickness and, (3) 360 – 450 dimples in the cover.

## 3. The '791 Patent

On January 20, 2004, over five and a half years after Bridgestone's '707 Patent issued, the PTO issued the '791 Patent, entitled "Golf Ball," to Bridgestone. The only named inventor of the '791 Patent is Hideo Watanabe. The '791 Patent, which like the '707 Patent discloses a three-piece solid golf ball, has claims directed toward the following combination of three elements: (1) a core with a hardness profile which is gradually increasing and a gradient of at least 22 degrees, (2) a three-or-more-piece structure whose key feature is that at least one intermediate layer is harder than the cover and the core, and (3) the use of a compounding agent such as zinc pentachlorothiophenol in the core formulation.

The '791 patent was filed in the PTO on June 15, 2001 and claimed priority to Japanese patent application No. 2000-1960640, filed June 26, 2000.

The original United States application for the '791 Patent claimed a core hardness gradient of "at least 18 degrees," and it only claimed cores with a "gradually increasing" hardness. The core gradient claim was rejected three times by the PTO. In the third office



action, the examiner rejected most of the '791's claims citing Bridgestone's '707 patent as anticipating the '791 claims. In particular, the examiner observed that the '707 patent taught a core with a hardness gradient of 8 to 20. The applicant then amended the claims in response to this office action and replaced the claim of a core gradient of at least 18 with a claim of a gradient of at least 22. The applicant argued to the PTO that, because the '707 patent did not show core gradients over 22, it did not anticipate the amended claim. In response to this, the examiner granted the claims of the '791 patent.

## **B. Overview of the Technology**

### **1. Hardness Gradients in Rubber Chemistry**

I have reviewed the expert report of Dr. Koenig, and I agree with him that formation of hardness gradients in cured rubbers is well-known in rubber chemistry. Scientists and engineers working on rubber molding have known about hardness gradients for decades. Much effort has gone into measuring and modeling the extent of cure in a molded rubber part. Also, academics have written papers on the modeling of the extent of cure in molded rubber parts.<sup>6</sup>

### **2. Hardness Gradients in the Golf Ball Art**

Hardness gradients were known to those in the golf ball field before the earliest priority date of the '707 patent (March 1996). The formation of a hardness gradient in the core is a natural result of the manufacturing process for solid rubber golf balls, and this too was well-known before the Bridgestone patents.

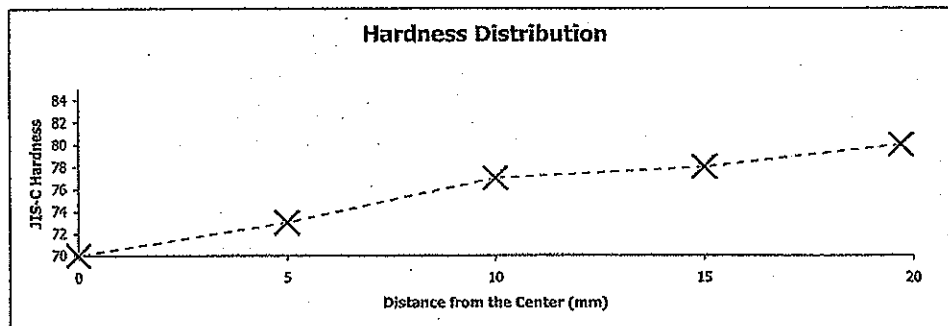
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<sup>6</sup> See Ex. 28, M.H.R. Ghoreishy & G. Naderi, Three-dimensional Finite Element Modeling of a Rubber Curing Process, 37 J. Elastomers & Plastics 37 (Jan. 2005). In 1980, Prentice and Williams published a paper on modeling the state of cure in a vulcanized rubber article. See Ex. 29, G.A. Prentice & M.C. Williams, Numerical Evaluation of the State of Cure in a Vulcanizing Rubber Article, 53 Rubber Chem. Tech. 1023 (1980). In 1990, Kau and Petruska published a paper on the formation gradients of other physical properties similar to hardness gradients during the molding process. See Ex. 30, H.T. Kau & L.A. Pertusha, Dimensional Stability and Property Gradients in Thick Sheet Molding Compound (SMC) Sections, 30 Polymer Engineering & Sci. 805 (July 1990). Lee has published research on calculating the temperature gradient created by the molding process in 1989, as well. See Ex. 31, C. Lee, Reaction and Thermal Analysis for SMC (Sheet Molding Compound) Molding in Complicated Geometries, 29 Polymer Engineering & Sci. 1051 (August 1989).

For example, U.S. Patent No. 6,645,496 (Ex. 32), which claimed priority from a 1993 Japanese patent application, shows the hardness distribution of example balls in Table 2 as follows:

			TABLE 2				
			Comparative Example No.				
			1	2	3	4	5
Core	Formulation	BR-01	100	100	100	100	100
		Zinc diacrylate	30	35	30	38	18
		Zinc Oxide	19	18	19	17.5	27
		Antioxidant	0.5	0.5	0.5	0.5	0.5
		Dicumyl peroxide	1.2	2.0	2.0	1.2	2.2
	Vulcanizing condition		140° C. x 25 min + 165° C. x 8 min	163° C. x 25 min	150° C. x 35 min	160° C. x 30 min	165° C. x 30 min
	Hardness	Center	74	70	69	73	38
	distribution	Location which is 5 mm away from the center	75	73	75	76	54
		Location which is 10 mm away from the center	77	77	77	78	58
		Location which is 15 mm away from the center	78	78	80	84	65
Cover		Surface	79	80	82	88	69
	Compression strength	(mm)	2.95	3.05	2.90	2.80	5.00
	Formulation	Hi-milane 1605	50	50	50	50	50
		Hi-milane 1706	50	50	50	50	50
	Stiffness	Kgf/cm <sup>2</sup>	3000	3000	3000	3000	3000
	Cover thickness	mm	1.6	1.6	1.6	1.6	1.6

Table 2 shows the hardness at several points between the center and the surface of the core.



Other examples of patents that disclose the presence of a core gradient in a golf ball prior to 1996 include U.S. Patent No. 4,714,253 (Ex. 33) (1987, showing a difference in hardness between the core center and a point 5 to 10 mm from the core center); U.S. Patent No. 5,002,281 (Ex. 34) (1991, showing a hardness at the core center and a point 5 to 10 mm from the core center); U.S. Patent No. 5,184,828 (Ex. 35) (1993, showing hardness in 5mm increments between the core

center and surface); U.S. Patent No. 5,711,723 (Ex. 36) (1995 application, showing a hardness gradient of not more than 4); and U.S. Patent No. 5,730,663 (Ex. 37) (1995 application, showing the hardness in 5mm increments between the core center and surface).

Still other patents show a gradient of greater than 22 degrees before the earliest priority date of the '791 patent (2000). Bridgestone's own U.S. Patent No. 5,830,085 (Ex. 38), for example, showed the use of a gradient of 5 to 25 degrees in a three-piece golf ball in 1998. United States Patent No. 6,390,935 (Ex. 39), filed in 1999, taught a gradient of 8 to 25 degrees. And U.S. Patent No. 6,386,993 (Ex. 40), also filed in 1999, claimed a gradient of 20 to 40 degrees.

### **3. Hardness Gradient in the Core Manufacturing Process**

Solid golf ball cores are manufactured through a curing process. During the curing of a golf ball core, raw polybutadiene is mixed with, among other things, a crosslinking agent or catalyst and heated in a mold. The use of peroxide catalysts, such as dicumyl peroxide, is common in the golf ball art. As the mold is heated, the peroxide breaks down, forming free radicals, which then cause the strands of polybutadiene to form bonds, or "cross-link," with each other. As the temperature increases and the curing time increases, the crosslinking increases. Crosslinking increases the hardness of rubber.

During the core manufacturing process, the rubber is heated by conduction from the hot metal mold. Heat is transferred from the mold to the surface of the cores, and then is conducted inwards. Because polybutadiene has a low thermal conductivity, the surface of the core heats up appreciably faster than the center. Therefore, there is a pronounced temperature difference in the core, with the outside of the core initially being much hotter than the center.

Conventional core molding processes are usually stopped before the core reaches complete thermal equilibrium. Consequently, the outer portions are heated to temperatures where peroxide decomposition and rubber crosslinking occurs for a longer time than the inner

portions. As a result, greater crosslinking occurs at the outside of the core than at the inside. Thus, the outside of the core becomes harder than the center.

Core hardness gradients become larger as the core curing times are decreased, where other influencing factors remain constant. Most golf ball manufacturers try to produce as many balls as they can in a given amount of time. Therefore, there is a tendency in the industry to use the minimum amount of cure time which results in a good product. This results in balls which have hardness gradients.

#### 4. Measuring the Core Hardness Gradient

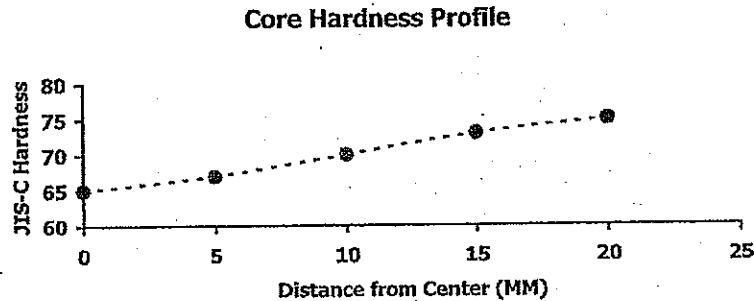
As already discussed, core hardness gradient is a measurement of how the hardness of the core rubber changes from the center of the core to the surface of the core.

Those in the golf ball art use an instrument called a durometer with a specially-shaped indenter to measure "hardness." The indenter is pressed against the core's surface with a defined force, and the durometer measures the amount of deflection of the surface in response to the force. This method of testing core hardness is described in various standards and specifies unique indenters and forces. JIS-C hardness refers to a standard published by the Japan Industry Standard. (See Ex. 41.) Shore-D hardness refers to a standard published by ASTM, International. (See Ex. 42.) The application of these tests to golf ball components is well-known in the golf ball art. It is understood that these tests are only repeatable to within several degrees, as the standard deviation within a laboratory is known to be roughly 0.8 degrees Shore D, and the reproducibility for tests conducted at different laboratories is roughly 16%.<sup>7</sup> Consequentially, a variation of several degrees between repeated tests of the same specimen is to be expected.

The core surface hardness is taken by first removing the golf ball's cover and intermediate layer, and placing the durometer directly on the core surface. In order to measure hardness at the center of the core, the core is first cut in half. See '707 Patent, Col. 7, ll. 8-12.

<sup>7</sup> See Ex. 42, ASTM D-2240, Table 4

The durometer is then applied to the center of the core. The hardness can be measured at other points between the center and the surface, as well. If the hardness is taken at many points between the center and the surface, it can be plotted, showing a hardness profile, as follows:



#### VIII. UNITED STATES PATENT NO. 5,782,707

The '707 patent discloses a three-piece solid golf ball comprising a solid core, an intermediate layer and a cover. Claim 1, the only asserted claim, reads:

A three piece solid golf ball of the three layer structure comprising a solid core, an intermediate layer and a cover having a plurality of dimples in the ball surface wherein the solid core, intermediate layer, and cover each have a hardness as measured by a JIS-C scale hardness meter wherein the core center hardness is up to 75 degrees, the core surface hardness is up to 85 degrees, the core surface hardness is higher than the core center hardness by 8 to 20 degrees<sup>8</sup>, the intermediate layer hardness is higher than the core surface hardness by at least 5 degrees, and the cover hardness is lower than the intermediate layer hardness by at least 5 degrees, and the dimples occupy at least 62% of the ball surface.

('707 Pat., Col. 10, ll. 55-67).

##### A. The '707 patent is anticipated by Bridgestone's 1994 Altus Newing Massy Golf Ball

I have concluded that claim 1 is invalid as anticipated by Bridgestone's own Altus Newing Massy golf ball. It is my understanding that Bridgestone sold the Altus Newing Massy in Japan since at least the fall of 1994 and that the Altus Newing Massy ball has been known and

<sup>8</sup> A degree is a unit of measurement on the JIS-C scale. JIS-C hardness is measured on a scale of zero to one hundred degrees.

used by Acushnet employees in the United States since November 1994. *See* AB 0004586-88.

Therefore, I have treated the Altus Newing Massy as prior art under 35 U.S.C. § 102.

I created a protocol for testing of prior art golf balls. Following my direction, Acushnet engineers tested six 1994 Altus Newing Massy golf balls in accordance this protocol on equipment that I personally inspected to perform the tests. The tests performed were done properly and objectively, and in accordance with the hardness testing prescribed in the '707 patent.<sup>9</sup> I have reproduced the raw data obtained by these tests below, as well as a table containing my analysis of this data.

**1994 ALTUS NEWING MASSY MEASURED VALUES<sup>10</sup>**

Sample No.	1	2	4	5	6
Cover Hardness (JIS-C)	80.8	80.8	81.3	81.1	79.8
	82.3	81.8	80.7	81.3	81.1
Intermediate Layer Hardness (JIS-C)	97.4	97	97.1	97.4	97.1
	97.3	96.5	97.5	96.8	97.2
Core Surface Hardness (JIS-C)	75.5	78	77.2	75.9	77.2
	76.6	77	77.5	76.3	77.6
Core Center Hardness (JIS-C)	66.1	66.1	64.6	66	63.2

**1994 ALTUS NEWING MASSY COMPARISON TO '707 PATENT**

Sample No.	1	2	4	5	6
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<sup>9</sup> One of the six sample balls, sample number three, is not listed above. Sample three had a core hardness gradient of 5.75 degrees. This is not significant as some golf balls in the same lot may vary from the others. I would expect to see variation in the hardness gradients in a sampling of Altus Newing balls. This does not affect my opinion that the '707 is invalid based on the Altus Newing Massy, as all the other sample balls met each element of claim 1.

<sup>10</sup> This table shows the raw test data. The results of two cover and intermediate layer hardness measurements, measured once at each pole, are shown here. The results of two core surface hardness measurements, again taken once at each pole, are also shown here. Core center hardness was measured once, at the core center. When more than one measurement was taken, the average values are used in the calculations below.

<b>wherein the core center hardness is up to 75 degrees,</b>	66.1	66.1	64.6	66	63.2
<b>the core surface hardness is up to 85 degrees,</b>	76.05	77.5	77.35	76.1	77.4
<b>the core surface hardness is higher than the core center hardness by 8 to 20 degrees</b>	9.95	11.4	12.75	10.1	14.2
<b>The intermediate layer hardness is higher than the core surface hardness by at least 5 degrees,</b>	21.3	19.25	19.95	21	19.75
<b>and the cover hardness is lower than the intermediate layer hardness by at least 5 degrees,</b>	15.8	15.45	16.3	15.9	16.7

My opinion, based on the results of these tests, is that the Altus Newing Massy golf ball includes each and every limitation of claim 1 of the '707 patent, as follows:

- All five balls had a core center hardness between 63 and 67.
- The average core surface hardness, measured at several points on the surface, fell between 76 and 78 degrees.
- The core surface hardness was always higher than the core center hardness by 8 to 20 degrees.
- The intermediate layer hardness, measured at two points on the surface of the sphere, was at least nineteen degrees harder than the core surface.
- The cover hardness, measured on the ball in two locations, was lower than the intermediate layer by at least fifteen degrees.
- Dimple coverage was 76.3%.

It is my opinion that these tests accurately reflect the properties of the golf balls when they were sold. Although the balls are over twelve years old, their multi-layer construction protects the core rubber from the elements, thereby preventing material degradation. It is known in the golf ball art that a polybutadiene rubber core can be adversely affected by moisture and possibly oxygen. But the Altus Newing Massy is encased in an ionomer resin cover and intermediate layer,<sup>11</sup> which would protect the core from the negative affects of moisture and oxygen permeation. In fact, golf ball cores are almost always covered with a material such as an ionomer, particularly the harder ionomers, for the very reason that this provides protection against the penetration of water vapor, thus keeping the core properties from degrading with time.<sup>12</sup> Therefore, many golf balls today have a polyurethane cover and an ionomer intermediate layer; and, as it is known in the art, one of the important functions of the ionomer intermediate layer is to protect the core from moisture penetrations.<sup>13</sup> While a suspected mechanism of core degradation may also be oxidation that can occur, this phenomenon has also been studied, and it has been noted in the art that ionomers act as an oxygen barrier in addition to a water barrier.<sup>14</sup>

My conclusion in this regard is supported by prior competitive testing performed on the Altus Newing Massy ball at Acushnet. AB 0004586-88, for example, shows prior testing of balls acquired by Acushnet in 1994, which indicates that it had a core surface hardness of 77 degrees Shore C. AB 0004583-85 also shows testing of core hardness on balls acquired in 1994, which had a surface hardness of 75 degrees Shore C. The average core surface hardness reported in the table above is 76.9 degrees, which is almost the same.

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<sup>11</sup> See AB 0004587.

<sup>12</sup> Ex. 44, U.S. Patent Application No. 2006/0128505, "Golf ball layers having improved barrier properties."

<sup>13</sup> Ex. 45, Plastics Design Library, "Permeability and Other Film Properties of Plastics and Elastomers."

<sup>14</sup> Ex. 46, U.S. Patent No. 6,398,668, col 1, lines 66-67.



**B. The '707 Patent is Obvious in Light of European Patent 0 633 043**

It is also my opinion that claim 1 of the '707 patent is invalid based on obviousness in light of the combination of European Patent 0 633 043, which discloses the claimed intermediate layer and core, and the knowledge of one skilled in the art.

EP 0 633 043 ("EP '043") (Ex. 47) issued on April 6, 1997 to Bridgestone, naming Hiroshi Higuchi, Hisashi Yamagishi, and Yoshinori Egashira as inventors of this patent. Mr. Yamagishi and Mr. Higuchi are also the two inventors on the '707 Patent. The EP '043 claims priority to a Japanese application filed in August 1993. As EP '043 claims priority before the priority date of the '707 patent (March 1996), I understand that EP '043 is prior art under 35 U.S.C. § 102(a).

EP '043 claims a three-piece solid golf ball that has a solid core, an intermediate layer and an outer cover layer, just like the golf ball disclosed in the '707 patent. The ball has an intermediate layer which is hard relative to the cover and the core. *See* [0010]. The purpose of the invention is to provide good flight performance, control, feel, and durability. *See* [0009].

The EP '043 patent teaches a core which is formed from a "well known rubber composition." *See* [0017]. Just like the '707 patent, the EP '043 patent provides the core recipe, core diameter, curing time, and curing temperature. *See* Table 1; [0023]. The specification discusses a core hardness of 45 to 80 degrees. *See* [0011].

The EP '043 reference provides nine example balls, and provides detailed instruction as to their manufacture. These instructions include the core composition, curing time, and curing temperature. Table 2 of the EP '043 patent discloses the resulting measurements for the cover hardness, intermediate layer hardness, and core surface hardness of the example balls... Although the inventors did not disclose the core center hardness of the example balls, based upon the teachings of the specification, one of ordinary skill in the art can easily determine that value.

The engineers followed the directions in the EP '043 patent to make and measure the properties of the core. Because the EP '043 patent's instructions are just as detailed as those of

the '707 patent, one of ordinary skill should get a consistent core center hardness by following the instructions in the patent.<sup>15</sup> The engineers manufactured a core and measured the core center hardness at 50.2 degrees. The core had a surface hardness of 67.4 degrees, which is equivalent to the example hardness of 66 degrees in light of the repeatability of durometer measurements.<sup>16</sup>

**a. "wherein the core center hardness is up to 75 degrees"**

The center hardness of the core manufactured in accordance with the recipe and curing conditions disclosed in EP '043 was 50.2 degrees, which meets this limitation.

**b. "the core surface hardness is up to 85 degrees"**

In Example 2 of Table 2, the EP '043 patent discloses a core with a surface hardness of 66 degrees, which meets this limitation.

**c. "the core surface hardness is higher than the core hardness by 8 to 20 degrees"**

The hardness gradient of the core manufactured in accordance with the recipe and curing conditions disclosed in EP '043 was 17.2 degrees, which meets this limitation.

**d. "The intermediate layer hardness is higher than the core surface hardness by at least 5 degrees"**

Example 2 of Table 2 discloses a core with a surface hardness of 66 degrees and an intermediate layer hardness of 91 degrees. This yields a difference of 25 degrees, which is well within the claimed range.

<sup>15</sup> That is, the variation in the results should be consistent with the measurement variation which I discussed above. In addition, since Acushnet owns English-unit molds, the tests used a 35.28 mm core mold in lieu of the 35.31 mm diameter specified in the patent. The difference between these diameters on core hardness is miniscule (0.09%).

<sup>16</sup> The relative repeatability of the Shore-D durometer measurement is 15.7%. See ASTM D-2240 (Ex. 42). The JIS-C test has a similar repeatability.

- e. **“the cover hardness is lower than the intermediate layer hardness by at least 5 degrees”**

Table 2 shows that Example 2 has a cover hardness of 82 degrees. *See* Table 2. This is nine degrees lower than the intermediate layer hardness, and therefore meets this limitation.

- f. **“the dimples occupy at least 62% of the ball surface”**

It would have been obvious to one of ordinary skill in the art in March of 1996 to use a dimple pattern of at least 62% when constructing Example 2 in Table 2. The EP '043 does not disclose the dimple coverage of the Example 2 ball. However, it evaluated the flying performance of the example balls, *see* [0027], and example 2 demonstrated good flying performance. *See* Table 2. One of ordinary skill in the golf ball art would recognize that, for a ball to have good flying performance, it would have to have dimples. Therefore, one of ordinary skill in the golf ball art would have looked to what was common in the golf ball art at the time the patentee filed the application that resulted in the EP '043 patent and use a comparable design.

Exhibit 48 is a summary of the percentage dimple coverage for a variety of golf balls from 1992 through 1994, and was generated from Acushnet's competitive test data. During that time period, I understand that Acushnet personnel routinely measured dimple characteristics of competitive golf balls using a profilometer device. Exhibit 48 lists percentage dimple coverage of numerous competitively tested balls, which have been calculated using the phantom sphere method described in the '707 specification. *See* Col. 5, l. 35 – col. 6, l. 15.

As Exhibit 48 shows, almost all of the competitive balls considered between 1992 and 1994 had dimple surface coverages well in excess of 62%. Dimple surface coverage has increased over time – so it would have been obvious to use at least surface coverage as was common at that time – not less. Consequentially, it would have been obvious to one of ordinary skill in the art to use a dimple pattern with at least 62% dimple coverage.

**IX. UNITED STATES PATENT NO. 5,803,834**

The '834 Patent discloses a two-piece golf ball. The patent claims that the ball has an optimized hardness distribution in the core and a desirable hardness difference between the core and the cover. Col. 2, ll. 22-23. Claim 1, the only claim asserted, reads:

A two-piece solid golf ball comprising a solid core and a cover enclosing the core and having a number of dimples in its surface, wherein

said solid core has such a distribution of hardness as measured by a JIS-C scale hardness meter that a surface hardness is up to 85 degrees, a center hardness is lower than the surface hardness by not less than 8 to less than 20 degrees, and a hardness within 5 mm inside the core surface is up to 8 degrees lower than the surface hardness,

said cover has a hardness which is higher than the surface hardness of the core by 1 to 15 degrees and a gauge<sup>17</sup> of 1.5 to 1.95 mm, and

the number of dimples is 360 to 450.

**A. The '834 Patent is Anticipated by Bridgestone's Precept EV Extra Spin Golf Ball**

Claim 1 of the '834 patent is anticipated by Bridgestone's own Precept EV Extra Spin golf ball. It is my understanding that Bridgestone sold the two-piece, EV Extra Spin golf ball in the United States as early as 1994,<sup>18</sup> and that a reference is prior art if it was sold in the United States more than one year before Bridgestone filed the application that resulted in the '834 patent (February 27, 1997). Therefore, it is my understanding that the EV Extra Spin is prior art.

I created a protocol for testing of prior art golf balls. Following my direction, engineers performed tests on six EV Extra Spin golf balls that Acushnet acquired in 1996. These tests were performed on equipment that I personally inspected, and it is my opinion that the tests were done properly. The tests results showed the EV Extra Spin golf ball to have the properties

<sup>17</sup> As used in the '834 patent, the term gauge is equivalent to the term thickness.

<sup>18</sup> See AB 4601.

specified in the '834 patent. I have reproduced the raw data obtained by these tests below, as well as table containing my analysis of this data.

**1996 PRECEPT EV EXTRA SPIN MEASURED VALUES<sup>19</sup>**

Sample No.	1	2	3	4	5	6
Cover Thickness, in	0.073	0.072	0.074	0.072	0.072	0.072
Cover Hardness, JIS-C	86.8	86.2	87.0	87.1	87.1	86.6
	86.5	87.0	87.4	87.0	86.5	86.7
Core Surface Hardness, JIS-C	79.9	80	81.1	80.4	80.6	80.4
	80	80.4	80.1	78.1	80.1	80.2
Core Center Hardness	66.8	64.8	70.7	70.9	66.0	67.3
Hardness at 5mm	77.7	77.7	76.5	74.5	77.7	76.3
	78.6	76.9	77.6	76.7	77.0	76.5
	76.7	77.3	77.9	75.2	76.8	77.3
	78.1	77.3	77.0	75.9	76.7	77.6

**1996 PRECEPT EV EXTRA SPIN COMPARISON TO '834 PATENT**

Sample No.	1	2	3	4	5	6
Said solid core has such a distribution of hardness as measured by a JIS-C scale hardness meter that a surface hardness is up to 85 degrees,	80.0	80.2	80.6	79.3	80.4	80.3
a center hardness is lower than the surface hardness by not less than 8 to less than 20 degrees,	13.2	15.4	9.9	8.3	14.4	13.0

<sup>19</sup> This table shows the raw test data. Cover thickness was found by taking the difference in average diameter, measured at the pole and two equator locations for each golf ball, before and after the cover is removed. The results of two cover hardness measurements, measured once at each pole, are shown here. The results of two core surface hardness measurements, again taken once at each pole, are also shown. Core center hardness was measured once, at the core center. The hardness at 5mm was measured at four discrete points, each of which was 5mm from the core surface. When more than one measurement was taken, the average values are used in the calculations below. (See Ex. 24.)

Sample No.	1	2	3	4	5	6
And a hardness within 5 mm inside the core surface is up to 8 degrees lower than the surface hardness,	2.2	2.9	3.3	3.7	3.3	3.4
Said cover has a hardness which is higher than the surface hardness of the core by 1 to 15 degrees	6.7	6.4	6.6	7.8	6.5	6.3
and a gage of 1.5 to 1.95 mm, and	1.85	1.83	1.88	1.83	1.83	1.83
the number of dimples is 360 to 450.	392	392	392	392	392	392

My opinion, based on the results of these tests, is that the EV Extra Spin golf ball includes each and every limitation of claim 1 of the '834 patent, as follows:

- All balls had a core surface hardness of less than 85 degrees.
- The difference between the center hardness and the surface hardness for all balls was between 8.3 to 15.4 degrees.
- The hardness within 5 mm inside the core surface for all balls was up to 8 degrees lower than the surface hardness.
- The cover hardness was 6.3 to 7.8 degrees higher than the surface hardness of the core.
- The gauge was between 1.83 mm and 1.88 mm
- All the balls had 392 dimples.

It is my opinion that these tests accurately reflect the properties of the golf balls when they were sold. Like the Altus Newing Massy ball, the Precept EV Extra Spin is encased in an ionomer resin cover.<sup>20</sup> Such a cover would protect the core from the possible negative affects of moisture and oxygen permeation. Furthermore, the measurements obtained by my tests correspond with my understanding of the Precept EV Extra Spin's properties as it was originally

<sup>20</sup> See AB 0044600

manufactured. For example, the Titleist and Foot Joy Competitive Ball Report, AB 0044585-622, shows the Precept EV Extra Spin as having a core center hardness of 67 degrees, and a core surface hardness of 79 degrees. These values correspond with the hardnesses reported in the table above. The average core surface hardness listed above is 80.1 degrees. The average core center hardness is 67.8 degrees.

As Bridgestone's EV Extra Spin meets all the limitations of the '834 patent, the golf ball anticipates the patent. Therefore, it is my opinion that the '834 patent is invalid.

**B. The '834 Patent is Anticipated by the 1993 Wilson Ultra Competition Golf Ball**

Claim 1 of the '834 patent is anticipated by the 1993 Wilson Ultra Competition golf ball as well. I understand that Wilson sold the two-piece Ultra Competition in the United States beginning in 1993. As Wilson sold this ball in the United States more than one year before Bridgestone filed the application that resulted in the '834 patent (February 27, 1997), it is my further understanding that the Wilson Ultra is prior art against the '834 patent.

I used the same testing protocol described above to have 1993 Wilson Ultra Competition prior art balls tested. I have reproduced below the data obtained by these tests for several balls that fell within the scope of the claims.

**1993 WILSON ULTRA COMPETITION MEASURED VALUES<sup>21</sup>**

	1	2	5	6
Cover Thickness	0.073	0.072	0.071	0.073
Cover Hardness	87.9	88.7	88.4	87.6
	88.1	88.1	88.6	87.1
Core Surface Hardness	80.4	79.6	80	80.3
	80.2	79.8	80.5	80.1
Core Center Hardness	66.3	68.4	69.7	65.4

<sup>21</sup> See Ex. 49.

Hardness at 5mm	74.5	74.7	74.7	75.4
	72.8	74.2	75.9	74.2
	74.7	73.9	76.2	75.1
	73	72.5	74.1	72.4

### 1993 WILSON ULTRA COMPETITION COMPARISON TO '834 PATENT

	1	2	5	6
said solid core has such a distribution of hardness as measured by a JIS-C scale hardness meter that a surface hardness is up to 85 degrees,	80.3	79.7	80.3	80.2
A center hardness is lower than the surface hardness by not less than 8 to less than 20 degrees,	14.0	11.3	10.6	14.8
and a hardness within 5 mm inside the core surface is up to 8 degrees lower than the surface hardness,	6.6	5.9	5.0	5.9
said cover has a hardness which is higher than the surface hardness of the core by 1 to 15 degrees	7.7	8.7	8.3	7.2
and a gage of 1.5 to 1.95 mm, and	1.85	1.83	1.80	1.85
the number of dimples is 360 to 450.	432	432	432	432

My opinion, based on the results of these tests, is that the Wilson Ultra Competition golf balls above include each and every limitation of claim 1 of the '834 patent, as follows:

- All balls had a core surface hardness of less than 85 degrees.
- The difference between the center hardness and the surface hardness for all balls was between 10.6 and 14.8 degrees.
- The hardness within 5 mm inside the core surface for all balls was up to 8 degrees lower than the surface hardness.



- The cover hardness was 7.2 to 8.7 degrees higher than the surface hardness of the core.
- The gauge was between 1.80 mm and 1.85 mm
- All the balls had 432 dimples.

As with the other balls discussed above, the Wilson Ultra Competition ball has an ionomer cover.<sup>22</sup> As already discussed, ionomeric covers serve as moisture and oxygen barriers, and protect the core from degradation. Moreover, my measurements correspond with my understanding of the Wilson Ultra Competition's properties as it was originally manufactured. For example the Titleist and Foot Joy Competitive Ball Report, AB 0044585-622, shows the Wilson Ultra Competition as having a core center hardness of 67 degrees, and a core surface hardness of 79 degrees. These values correspond with the hardness reported in the table above. The average core surface hardness listed above is 80.1 degrees. The average core center hardness is 67.5 degrees.<sup>23</sup>

As the above Wilson's Ultra Competition balls meet all the limitations of the '834 patent, the golf ball anticipates the patent. Therefore, it is my opinion that the '834 patent is invalid.

#### **X. UNITED STATES PATENT NO. 6,679,791**

The '791 patent is directed to a multi-piece golf ball. This patent asserts that the disclosed golf ball has improved flight distance, controllability, and feel. *See* Ex. 27, Abstract. The only difference between the '791 patent and the '707 patent, however, is that the '791 patent claims a hardness gradient of 22 and above.

Bridgestone is asserting Claims 11, 13, 16, and 26. Claim 11 depends from claim 1 and claim 26 depends from claim 24. Therefore, I have reviewed the validity of claims 1, 11, 13, 16, 24 and 26. Claim 1 of the '791 patent reads:

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<sup>22</sup> *See* AB 0044600.

<sup>23</sup> My opinion is also supported by data from Acushnet's competitive testing performed in 1993 when the balls were first examined. *See* AB 0004466-67. The average test value for core surface hardness in 1993 was 79 degrees and the average core center hardness was 67 degrees, which are comparable with the recently measured values.

A golf ball comprising a rubbery elastic core having a center and a radially outer surface, a cover having a plurality of dimples on the surface thereof, and at least one intermediate layer situated between the core and the cover; wherein said intermediate layer is composed of a resin material which is harder than the cover and has a greater hardness than the surface of the elastic core when compared using the same hardness scale, and said elastic core has a hardness which gradually increases radially outward from the center to the surface thereof, and a difference in JIS-C hardness of at least 22 between the center and the surface.

Claim 11 of the '791 patent reads:

The golf ball of claim 1, wherein said elastic core is formed of rubber as the base material comprising an ingredient selected from a group consisting of pentachlorothiophenol, pentafluorothiophenol, pentabromothiophenol, p-chlorothiophenol and the zinc salt of pentachlorothiophenol.

Claim 13 of the '791 patent reads:

A golf ball comprising a rubbery elastic core having a center and a radially outer surface, a cover having a plurality of dimples on the surface thereof, and at least one intermediate layer situated between the core and the cover; wherein said intermediate layer is composed of a resin material which is harder than the cover, and has a greater hardness than the surface of the elastic core when compared using the same JIS-C hardness scale, and said elastic core has a hardness at the center and a hardness at the surface thereof which is greater than the hardness at the center thereof, and a difference in JIS-C hardness of at least 22 between the center and the surface.

Claim 16 of the '791 patent reads:

The golf ball of claim 13, wherein the intermediate layer has a Shore D hardness of 50 to 67.

Claim 24 of the '791 patent reads:

A golf ball comprising a rubbery elastic core having a center and a radially outer surface, a cover having a plurality of dimples on the surface thereof, and at least one intermediate layer situated between the core and the cover; wherein said intermediate layer is composed of a resin material which is harder than the cover having a Shore D hardness of 45 to 58 and has a greater hardness than the surface of the elastic core when compared using the same hardness scale, and said elastic core has a hardness at the center and a hardness at the surface thereof which is greater than the hardness at the center thereof, and a difference in JIS-C hardness of at least 22 between the center and the surface.

Claim 26 of the '791 patent reads:

The golf ball of claim 24, wherein said elastic core is formed of rubber as the base material comprising an ingredient selected from a group consisting of pentachlorothiophenol, pentafluorothiophenol, pentabromothiophenol, p-chlorothiophenol and the zinc salt of pentachlorothiophenol.

**A. *Markman* Proceedings Related to the '791 Patent**

I understand that one of the terms in the asserted claims of the '791 patent is at issue in *Markman* proceedings before the Court. Specifically, the parties dispute the meaning of "gradually increases." Acushnet contends that "gradually increases" means having a shape which is neither steep nor abrupt." (Acushnet Opening *Markman* Brief, CC). Bridgestone asserts "gradually increases" should be given its plain meaning. (Bridgestone Opening *Markman* Brief, DD). Under either of these current constructions, it is my opinion that the '791 is invalid.

**B. The '791 Patent is Anticipated by United States Patent No. 5,779,563**

As set forth below, I have analyzed the claims of the '791 patent and conclude that each of claims 1, 11, 13, 16, 24 and 26 of the '791 patent are anticipated by United States Patent No. 5,779,563 (the '563 Patent) (Ex. 50). The PTO issued the '563 Patent to Bridgestone in 1998. The named inventors are Hisashi Yamagishi, Tasushi Ichikawa, and Atsushu Nakamura. Yamagishi was also an inventor on the '707 and '834 patents. The '563 patent was published more than a year before the '791 patent's foreign priority date, and, therefore, is prior art.

The '563 Patent discloses a three piece dimpled golf ball with improved flight distance, controllability, roll, and straight travel upon putting. *See Abstract*. The '563 patent teaches a multi-layer ball with a cover, intermediate layer, and core. *See Abstract*.

**1. Claim 1 of the '791 patent**

The preamble to claim 1 of the '791 patent states that it relates to a "golf ball comprising a rubbery elastic core having a center, and a radially outer surface, a cover having a plurality of dimples..., and a least one intermediate layer between the core and the cover." The '563 patent also relates to the manufacture of such a golf ball. The '563 golf ball discloses a multi-piece

solid golf ball comprising "a solid core and a cover of at least two layers enclosing the core and having a number of dimples... The solid core is made of a rubber base..." ('563 patent, *Abstract*.)

Claim 1 requires that the intermediate layer is composed of a resin material which is harder than the cover and has a greater hardness than the surface of the elastic core when compared using the same hardness scale. The '563 patent discloses the core, cover and intermediate layer properties in Table 4:

TABLE 4

		E1	E2	E3	E4	CE1	CE2	CE3
Core	Weight	25.44	29.02	26.19	27.10	33.53	25.44	14.69
	Diameter	35.50	37.00	36.00	36.00	38.70	35.50	27.70
	Distortion under 100 kg load	2.20	2.20	2.60	3.30	2.50	2.20	4.00
	Volume	23.43	26.52	24.43	24.43	30.35	23.43	11.13
Inner cover	Specific gravity	1.086	1.094	1.072	1.109	1.105	1.086	1.320
	Type *5	a	a	a	b	—	a	a
	Weight (g)	33.20	35.90	32.84	32.84	—	33.20	34.52
	Diameter (mm)	38.75	39.70	38.75	38.75	—	38.75	38.30
	Volume	7.04	6.24	6.04	6.04	—	7.04	18.29
	Specific gravity (calcd.)	1.102	1.102	1.102	0.950	—	1.102	1.102
	Net weight	7.76	6.88	6.65	5.74	—	7.76	20.15
	Gage	1.63	1.35	1.38	1.38	—	1.63	5.30

TABLE 4-continued

		A	A	B	B	C	A	D
Outer cover	Type	10.30	8.00	10.30	10.30	10.42	10.30	11.35
	Volume	12.10	9.40	12.46	12.46	11.77	12.10	10.78
	Net weight (g)	1.175	1.175	1.210	1.210	1.130	1.175	0.950
	Specific gravity	1.98	1.50	1.98	1.98	2.00	1.98	2.10
Ball	Gage (mm)	45	45	53	53	55	45	65
	Shore D hardness	45.30	45.30	45.30	45.30	45.30	45.30	45.30
	Weight (g)	42.70	42.70	42.70	42.70	42.70	42.70	42.70
	Diameter (mm)	85.2	85.0	85.8	84.8	84.5	85.2	80.6
Inertia moment		88.4	88.4	89.0	89.0	89.2	88.4	90.0
	M <sub>UL</sub>	81.4	81.4	82.0	82.0	82.2	81.4	83.0
	M <sub>DL</sub>	I	II	I	II	I	III	I
Dimple type		184.5	185.2	185.7	185.5	180.3	177.0	183.0
Flying distance	Carry (m)	198.6	199.0	200.0	200.5	195.7	191.5	197.5
CHS40	Total (m)	○	○	○	○	X	○	○
Scrape resistance		○	○	○	○	Δ	○	Δ
Continuous durability		○	○	○	○	Δ	○	○
Feeling								
*5 Inner cover type		a	b					
HYTREL 4047		100						
HIMILAN 1706		50						
HIMILAN 1605		50						

Table 4 only specifically discloses the hardness of the outer cover. The Shore D cover hardness of the golf ball in Example 4 is 53.

The hardness of the inner cover and the core, however, are inherent in the patent specification. Table 4, footnote 5, of the '563 patent shows that Example 4 ("E4") has a type "b"

inner cover.<sup>24</sup> A cover type “b” inner cover is a blend of 50 parts Himilan 1706 and 50 parts Himilan 1605. This particular blend of Himilan 1706 and 1605 is common in the prior art, and its properties are well-known. Himilan is an ionomer resin. Therefore, just like the ‘791 golf ball, the ‘563 ball has an intermediate layer made of resin.

Also, Bridgestone’s ‘852 patent, published in 1996, shows that this Himilan blend has a JIS-C hardness of 91 degrees. One of ordinary skill in the art knows that it is possible to convert Shore D hardness measurements to the JIC-S scale using a conversion formula. The formula is an approximation based upon experimental tests. DuPont has published one such formula (See Ex. 8):

$$\text{Shore D} = (0.76 \bullet \text{JIS C}) - 8^{25}$$

U.S. Patent No. 5,645,496, issued in 1997, shows that this Himilan blend has a Shore D hardness of 62. A Shore D hardness of 62 corresponds to a JIS-C hardness of 92 degrees. Bridgestone’s U.S. patent No. 6,267,694, shows that the blend has a Shore D hardness of 62 degrees. Therefore, one of ordinary skill in the art would understand that a blend of Himilan 1706 and 1605 has a JIS-C hardness of 91-92 degrees and a Shore D hardness of 62.

As the intermediate layer, with a Shore D hardness of 62 degrees, is harder than the cover, the ‘563 also meets this limitation of claim 1 of the ‘791 patent.

Although the ‘563 does not disclose the hardness of the cores, the ‘563 patent gives the recipe for each example core. See Col 7, 1. 45- Col. 8, 1. 10. Table 1. The curing time (18 minutes) and temperature (160°) is also provided in the specification. See Col, 6, 1. 50. Therefore, I had the cores of Example 4 of the ‘563 patent reproduced in accordance with the

<sup>24</sup> One of ordinary skill in the art would understand that the “inner cover” of the ‘563 patent is the same feature identified as the “intermediate layer” in the ‘791 patent. Both patents disclose a multi-piece solid golf ball. The Figure 1 in both patents are almost identical and the brief description of the drawings in the ‘563 and ‘791 patent identify the same middle layer when referring to the “inner layer” and “intermediate layer,” respectively.

<sup>25</sup> I recognize that other conversion formulas are also used in the golf ball art. Bridgestone’s own documents list three other conversion formulae: (1) Shore D = (0.886 • JIS C) – 16.31; (2) Shore D = (0.7637 • JIS C) – 8.2925; and (3) Shore D = (0.7982 • JIS C) – 10.28. (See Ex. 51.)

recipe and curing time and temperature given in the '563 patent. The resulting core hardness measurements were as follows:<sup>26</sup>

Sample	Core Surface Hardness, JIS-C	Core Center Hardness, JIS-C	Hardness Gradient, JIS-C
1	86.2	55.4	30.8
2	86.1	57.5	28.6
3	86.0	57.2	28.8
4	86.2	58.0	28.2
5	85.9	59.4	26.5
6	86.4	60.5	25.9

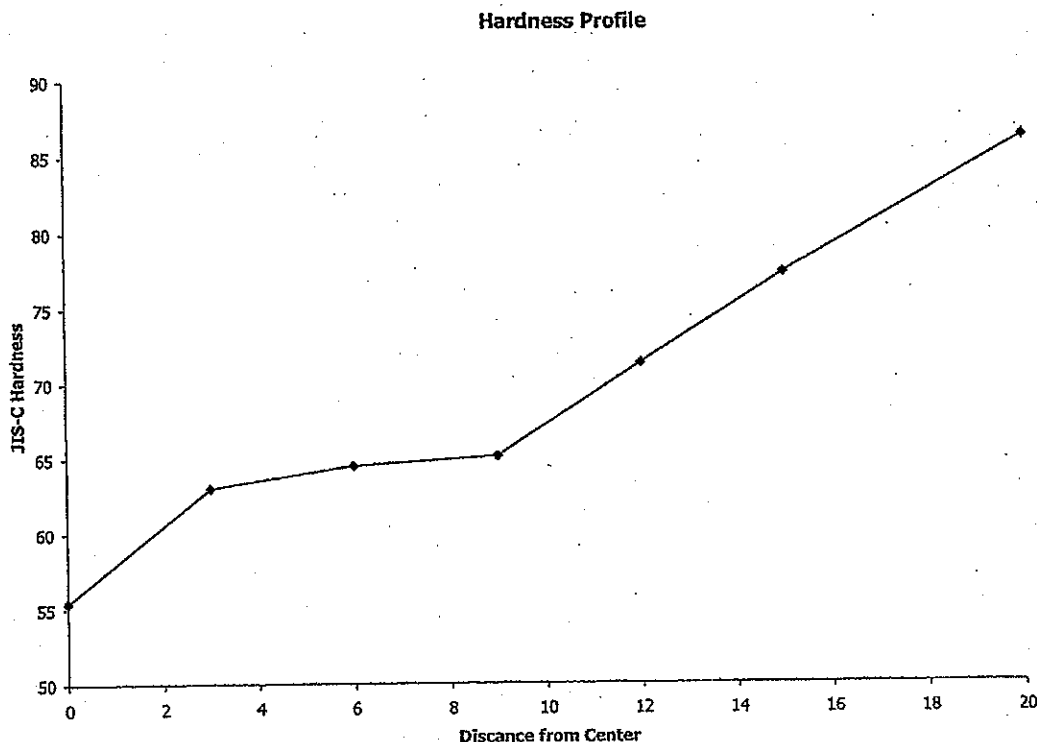
All six cores had a surface hardness less than 87 degrees JIS-C. The intermediate layer has a hardness of 91 degrees. Therefore, the intermediate layer has a greater hardness than the surface of the core just like the intermediate layer in claim 1 of the '791 patent.

Claim 1 of the '791 patent also requires that the elastic core have a hardness which "gradually increases radially outward from the center to the surface of the core." In order to determine whether the '563 met this limitation, I generated a core hardness profile for one of the sample cores made according to the recipe in the '563 patent, as follows:<sup>27</sup>

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<sup>26</sup> See Ex. 52.

<sup>27</sup> See Ex. 53.



As I stated above, regardless of which parties definition of “gradually increases” I use, it is my opinion that the plot of the hardness profile above does gradually increase. In fact, one of ordinary skill in the art would expect that a one-piece core manufactured in accordance with the instructions (recipe and curing time and temperature) of the ‘563 patent would gradually increase in hardness, or in other words, not have an steep or abrupt changes in hardness. Therefore, the ‘563 patent meets this limitation of claim 1.

Finally, claim 1 also requires that the elastic core have a “difference in JIS-C hardness of at least 22 between the center and the surface.”

All six sample cores had a hardness gradient of between 25 and 31 degrees JIS-C. Therefore, the ‘563 patent discloses each and every limitation of claim 1, and thus, anticipates claim 1 of the ‘791 patent.

## 2. Claim 11 of the '791 patent

Claim 11 of the '791 patent depends from claim 1 and further requires that the "elastic core is formed of a rubber as the base material comprising an ingredient selected from a group consisting of pentachlorothiophenol, pentafluorothiophenol, pentabromothiophenol, p-chlorothiophenol and the zinc salt of pentachlorothiophenol."

Table 1 of the '563 Patent shows that Example 4 of the '563 patent contains 0.2 pph weight of zinc pentachlorothiophenol. Therefore, the '563 patent discloses each and every limitation of claim 11; and thus, anticipates claim 11 of the '791 patent.

## 3. Claim 13 of the '791 Patent

Claim 13 of the '791 patent is an independent claim. Claim 13, however, substantively has all the limitations of claim 1, but requires that the "intermediate layer is composed of a resin material which is harder than the cover and has a greater hardness than the surface of the elastic core when compared using the same JIS-C hardness scale."

Returning to Table 4 of the '563 patent, it shows that the cover hardness of Example 4 is 53 degrees Shore D. Using the equation that converts Shore D hardness to JIS-C hardness, a 53 Shore D hardness equals 80.3 degrees JIS-C.<sup>28</sup>

Since the blend of Himilan resins used in Example 4 is known to have a JIS-C hardness of 91 degrees, the intermediate layer is harder than the cover of Example 4 using the JIS-C hardness scale. Therefore, the '563 patent discloses each and every limitation of claim 13; and thus, anticipates claim 13 of the '791 patent.

## 4. Claim 16 of the '791 Patent

Claim 16 of the '791 patent depends from Claim 13 and further requires that the intermediate layer has a Shore D hardness of 50 to 67. The intermediate layer disclosed in Example 4 of the '563 patent is made of the Himilan 1605 and 1706 blend has a Shore-D hardness of 62 degrees, which is within the claimed range of the '791 patent. Therefore, the '563

<sup>28</sup> Using Bridgestone's conversion formulae, the JIS-C hardness is calculated to be 78.2, 80.3, and 79.3, respectively. The claim limitation is met regardless of which of the values I use.



patent discloses each and every limitation of claim 16; and thus, anticipates claim 16 of the '791 patent.

#### 5. Claim 24 of the '791 Patent

Claim 24 of the '791 patent is an independent claim. Claim 24, however, also is substantively the same as claim 1, but requires that the intermediate layer is harder than the cover "having a Shore D hardness of 45 to 58."

The cover hardness of Example 4 of the '563 patent is 53 degrees Shore D. Since the intermediate layer, with a Shore D hardness of 62 degrees, is harder than the cover, the '563 patent meets this limitation of claim 24 of the '791 patent, as well as the others. Therefore, the '563 patent anticipates claim 24 of the '791 patent.

#### 6. Claim 26 of the '791 Patent

Claim 26 of the '791 patent depends from Claim 24 and further requires that the "elastic core is formed of a rubber as the base material comprising an ingredient selected from a group consisting of pentachlorothiophenol, pentafluorothiophenol, pentabromothiophenol, p-chlorothiophenol and the zinc salt of pentachlorothiophenol."

Table 1 of the '563 Patent shows that Example 4 of the '563 patent contains 0.2 pph weight of zinc pentachlorothiophenol. Therefore, the '563 patent discloses each and every limitation of claim 26; and thus, anticipates claim 26 of the '791 patent.

#### C. United States Patent No. 6,174,247 Renders the '791 Patent Obvious

I understand that even if a claim is not anticipated by the prior art, the claim may still be rendered invalid if it is obvious in light of the prior art. When determining obviousness, more than one reference may be combined to invalidate the claim in question. When combining references, I understand that a motivation to combine the references must exist in the references themselves, or in light of the experience of one of ordinary skill in the art.

I have analyzed the claims of the '791 patent and conclude that each of claims 1, 11, 13, 16, 24 and 26 of the '791 patent are rendered obvious by United States Patent No. 6,174,247 (the

'247 Patent) (Ex. 54). The PTO issued the '247 Patent to Bridgestone in 2001. It claims priority to a Japanese application dated August 8, 1997, and was filed August 10, 1998. As the '247 patent application was filed more than one year before either the foreign filing date or the U.S. filing date of the '791 patent, I understand that it is prior art. The named inventors are Hiroshi Higuchi, Yasushi Ichikawa, Hisashi Yamagishi, and Junji Hayashi. Yamagishi is also a named inventor on the '707 and '834 patents.

The '247 patent relates to a multi-piece solid golf ball comprising a solid core enclosed with a cover of two inner and outer layers. The '247 patent discloses that the core is formed relatively soft, the inner cover layer is formed mainly of an ionomer resin and has a Shore D hardness of 28 to 58, and the outer cover layer has a Shore D hardness of 28 to 55. *See* Col. 1, ll. 31-39. The '247 patent asserts, as does the '791 patent and 563, that the disclosed ball results in increased flight distance, superior control and better feel. *See* Col. 4, ll. 52-54.

Again, just like the '563 and '791, the '247 patent, in Table 5, discloses the core, cover and intermediate layer properties in Table 4:

TABLE 5

	Comparative Example					
	1	2	3	4	5	6
<u>Core</u>						
Weight (g)	25.83	30.25	27.47	29.72	30.76	29.16
Diameter (mm)	35.50	36.40	35.30	36.50	36.50	36.50
Distortion @ 100 kg (mm)	2.20	3.00	4.00	2.90	2.90	3.20
Specific gravity	1.103	1.198	1.193	1.167	1.208	1.145
<u>Inner cover layer</u>						
Type	e	f	e	e	g	h
Shore D hardness	40	42	40	40	56	62
Specific gravity	1.12	1.01	1.12	1.12	0.98	0.98

TABLE 5-continued

	Comparative Example					
	1	2	3	4	5	6
Gage (mm)	1.63	1.80	1.70	1.60	1.60	1.60
<u>Outer cover layer</u>						
Type	A	D	E	F	G	A
Specific gravity	1.183	0.980	0.980	0.980	0.980	1.183
Gage (mm)	1.98	1.35	2.00	1.50	1.50	1.50
Shore D hardness	50	45	62	53	58	50
<u>Ball</u>						
Weight (g)	45.30	45.30	45.30	45.30	45.30	45.30
Diameter (mm)	42.70	42.70	42.70	42.70	42.70	42.70
Inertia moment (g-cm <sup>2</sup> )	84.6	81.2	81.3	82.1	80.9	83.4
<u>#W1/HS45</u>						
Carry (m)	208.1	205.3	207.9	205.8	207.9	208.1
Total (m)	217.2	217.5	221.0	218.1	219.2	220.3
Spin (rpm)	3075	3001	2548	2898	2689	2734
Feeling	X		O		O	O
#SW/FIS20 approach spin (rpm)	6251	6236	4923	6211	5632	6132
#PT feeling	O	ΔO	X	ΔO	X	X
Scraping resistance	O	Δ	O	Δ	Δ	X
Consecutive durability	O	O	X	O	O	X

Table 5 specifically discloses the hardness of the outer cover and the inner cover. The Shore D outer cover hardness of the golf ball in Example 6 is 50. The Shore D inner cover hardness of Example 6 is 62. Since the inner cover is harder than the outer cover, this limitation of claim 1 is met.

Although the '247 patent does not disclose the specific hardness of the cores made according to its teachings, the '247 patent does provide the recipe used to make each exemplary

core. *See* Col. 5, Table 1. The '247 patent also discloses a curing temperature range (130-170°C). *See* Col. 3, l. 5. This curing temperature range covers temperatures commonly used in the golf ball art.

It is within the range of ordinary skill in the art to modify a core formulation recipe and/or to adjust the curing conditions in order to optimize core properties such as compression. For example, the core recipe and curing conditions are changed in factories between the summer and the winter or between two production lines making the same ball so as to achieve consistent core properties.

Curing times of between 10 and 60 minutes and curing temperatures of between 120 and 190°C are common in golf ball manufacturing. The selection of curing conditions within this range for a particular ball is the choice of one of ordinary skill in the art, depending on the desired features of a particular golf ball.

I had cores made using the recipe of Comparative Example 6 of the '253 patent. Although the '247 patent does not specify the precise curing temperature and time, it would be obvious to one skilled in the art would know the basic parameters for selecting the conditions that would produce a core with a hardness gradient of 22 or more. It would involve only the application of routine skill in the art to select the right time and temperature from the well-known parameters.

For example, one set of conditions used to make cores at Acushnet in high volumes involves selecting a curing time and curing temperature of 11 minutes and 335°F, respectively. Using this time and temperature, and otherwise following the teachings of the 247 patent, I had cores made that resulted in core hardness gradients of well over 22. The use of this common curing time and curing temperature in conjunction with the teachings of the '247 patent yielded a golf ball which satisfies claims 11, 13, 16, and 26 of the '791 patent.

The hardness of the cores in Example 6 is shown below:<sup>29</sup>

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<sup>29</sup> *See* Ex. 52.

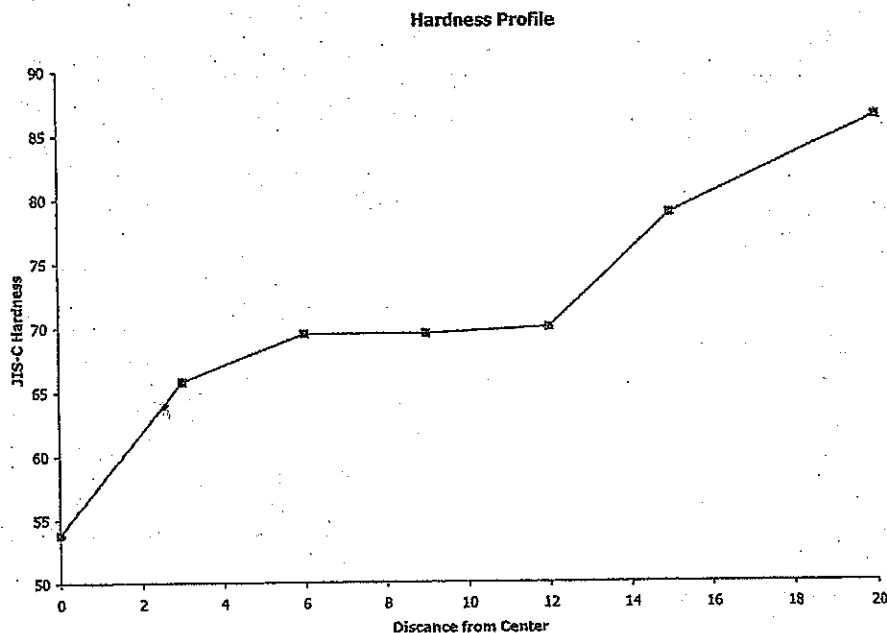
Sample	Core Surface Hardness	Core Center Hardness	Core Gradient
1	86.4	60.7	25.7
2	86.4	53.8	32.6
3	86.6	59.8	26.8
4	86.5	60.9	25.6
5	86.6	56.2	30.4
6	87.2	60.0	27.2

Comparative Example 6 has an intermediate layer with a Shore D hardness of 62. Using the DuPont conversion formula, this converts to a JIS-C hardness of 92 degrees.<sup>30</sup> The highest core surface hardness of sample cores was 87.2 degrees. Since the intermediate layer has a greater hardness than the surface of the core another limitation of claim 1 is met.

I had one of the sample cores measured to determine the core hardness profile generated by this curing process:<sup>31</sup>

<sup>30</sup> Using the alternative formulae, the JIS-C hardness is calculated to be 88, 92, and 91, respectively. The claim limitation is met regardless of which of these values I use.

<sup>31</sup> See Ex. 53.



The plot of the hardness profile above gradually increases. In fact, one of ordinary skill in the art would expect that a one-piece core manufactured in accordance with the instructions of the '247 and the knowledge of one skilled in the art would gradually increase in hardness, or in other words, not have any steep or abrupt changes in hardness. Therefore, the '247 patent meets this limitation of claim 1.

Finally, claim 1 also requires that the elastic core have a "difference in JIS-C hardness of at least 22 between the center and the surface." All of the sample cores had a hardness gradient between 25.7 and 32.6 degrees JIS-C, which is well above 22 degrees.

Table 1 of the '247 patent gives the formulations for each of the example cores. As can be seen, all example balls make use of 1 phw of the zinc salt of pentachlorothiophenol, which satisfies claim 11 of the '791 patent.

Table 5 of the '247 patent shows that the cover hardness of Comparative Example 6 is 62 degrees Shore D. This converts to 76 degrees JIS-C using the DuPont conversion.<sup>32</sup> The

<sup>32</sup> Using the Bridgestone conversion formulae, the JIS-C hardness is calculated to be 75, 76, and 76, respectively. The claim limitation is met regardless of which of these values I use.

intermediate layers in Comparative Example 6 have a Shore D hardness of 62, which converts to a JIS-C hardness of 92 degrees. Therefore, the intermediate layer is harder than the cover when compared using the JIS-C hardness scale.

Claim 16 of the '791 patent depends from Claim 13 and further requires that the intermediate layer has a Shore D hardness of 50 to 67. Table 4 of the '247 patent gives the Shore D hardness of all intermediate layers. As can be seen above, Comparative Example 6 possesses an intermediate layer of 62 degrees Shore D.

Claim 24 of the '791 patent is an independent claim. Claim 24, however, also is substantively the same as claim 1, but requires that the intermediate layer is harder than the cover "having a Shore D hardness of 45 to 58." Table 4 of the '247 patent lists the Shore D hardness of the example ball covers. Comparative Example 6 has a cover hardness of 50 degrees Shore D.

**D. The '791 Patent is Rendered Obvious In View of U.S. Patent No. 6,390,935**

United States Patent No. 6,390,935 (Ex. 39) issued to Sumitomo Rubber Industries on May 21, 2002. Kazushige Sugimoto was the inventor. Its application was filed on October 7, 1999, which is before the Japanese priority date of the '791 patent. The purpose of the invention is to achieve good flight distance, controllability, and feel. Col. 2, ll. 10-14. It provides a multi-layered golf ball with special relationships between the hardness of different layers. In particular, it shows a "center," or core, with a difference in hardness between its center and surface of at least 8 degrees JIS-C. Col. 2, ll. 22 - 25.

The '935 patent provides a three-piece golf ball with a "center," "outer shell," and a "cover."<sup>33</sup> Col. 2, ll. 15 - 21. The center may have a hardness which is gradually increased from its center point to its surface. Col. 2, ll. 62-64. The center has a hardness at its surface which is

<sup>33</sup> One of ordinary skill in the golf ball art would recognize that the three piece structure shown in the '935 patent corresponds to the structure in the '791 patent. The center discussed in the '935 patent corresponds with the core discussed in the '791 patent. The outer shell discussed in the '935 patent corresponds with the intermediate layer claimed in the '791 patent.

higher than the hardness at its center point by 8 degrees, preferably by 10 degrees. Col. 3, ll. 3 – 8. The difference in hardness is preferably 25 degrees or smaller. Col. 3, ll. 22 – 24. Organic sulfide compounds may be used in the center. Col. 4, ll. 66 – 68. Dimples are formed into the ball's cover. Col. 8, ll. 42-43.

Each of claim 11, 13, 16, and 26 of the '791 patent is obvious by the combination of the '935 patent with the '563 patent and/or the '247 patent. Each reference is generally directed to the same problem of obtaining good flight distance and controllability. The '563 patent is directed to improving the flying distance, controllability, straight travel and roll of the golf ball. Col. 1, ll. 55-57. The '247 patent is directed toward improving flight distance, control, feel, and durability. Col. 2, ll. 11-16. The '935 patent is directed towards good flight distance, controllability, and feel. Col. 2, ll. 10-14. All three patents teach the use of three-piece golf balls.

The '935 patent teaches that having a hardness gradient less than 8 would result in having either a poor shot feeling, poor durability, or poor flight distance. Col. 3, ll. 3-22. The patent also teaches that a hardness gradient of up to 25 degrees is preferred. Col. 3, ll. 21-23. It would be obvious to use a core with this hardness gradient to obtain the shot feeling, durability, and flight distance desired in the '247 and '563 patents.

**E. The '791 Patent is neither Enabled nor Supported by the Written Description**

The '791's specification shows that Bridgestone did not invent any technology embodied in the '791 patent which fulfills the entire range of the claim limitation, "[said elastic core] has a difference in JIS-C hardness of at least 22."

The maximum theoretical core hardness gradient is about 100 degrees.<sup>34</sup> However, technology that can create such a gradient is not known in the art. There are limits on what is

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<sup>34</sup> There is a theoretical upper limit of core hardness gradient. You would achieve this limit by curing the core in such a manner that the outer surface is completely vulcanized and is made as hard as possible, and the center is completely uncured. I can assume that the completely vulcanized rubber could be made to have nearly the



generally known to be achieved in curing a single piece of polybutadiene. Conventional techniques have an upper limit on the gradient that they can achieve.

The specification does not describe the use of any technology that would yield gradients in excess of 40 or 50 degrees. Golf ball cores can be *single layer*, or made from a single piece of polybutadiene, or *multilayer*, or made of two or more layers of polybutadiene. A multilayer core can have a larger core gradient, because a soft inner rubber can be wrapped inside a different, harder, outer rubber. The Pro V1x, which has a soft inner core surrounded by a hard outer core, is an example of a multi-layer ball. Because a single layer core is made of one material, however, its gradient can only be made through curing the core in a non-uniform manner. There is a limit to how soft the center can be kept while still curing the outer cover.

I agree with Mr. Shimosaka of Bridgestone that obtaining a gradient of over forty in a single layer core would require a new idea or technology which is not currently known in the golf ball art, and certainly was not disclosed in the specification of the '791 patent.

Q. Now, if you wanted to create a single-layer core that had a very high gradient, let's say 40, that would involve a significant amount of experimentation to try to make that work, right? . . .

A. *Well, rather than any significant amount of experimentation I think that would require an innovative conception of idea or technology.*

11/16/2006 Deposition of Hirota Shimosaka 56:10 to 56:20

The specification of the '791 patent is directed towards single-core balls. It only discusses single cores – it never mentions the use of multiple core layers. The patent emphasizes the necessity of a “gradually increasing” hardness profile.<sup>35</sup> A multilayer core cannot have a gradually increasing hardness – its hardness takes a distinct jump between the softer inner core

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maximum hardness measurable on the JIS-C scale, 100 degrees, and that the uncured rubber would have nearly the minimum, zero degrees. Therefore, the maximum theoretical hardness gradient can never exceed 100 degrees.

<sup>35</sup> See Col. 2, ll. 6-9; col. 4, ll. 1-5. The only originally filed claim was directed towards cores with a gradually increasing hardness. See Originally Filed Specification at 15. Independent claims 13 and 24, which did not have this limitation, were added later by amendment. See August 15, 2002 Amendment.

and harder outer layer. Because the specification emphasizes the use of a gradually increasing hardness, it clearly does not address the use of multilayer cores like that in the Pro V1x.

The specification of the '791 patent does not teach the use of cores with gradients over 30. In fact, it teaches away from cores with gradients over 30. It teaches that the upper limit of the hardness difference is "at most 30, preferably 27 or less, and most preferably 25 units or less." Col. 3, ll. 43-45. Table 3 shows three Example cores and six Comparative Examples. See Table 3. All of these examples have gradients of 24 or less.

TABLE 3

			Example			Comparative Example				
			1	2	3	1	2	3	4	5
Core	Compo- sition (pbw)	1,4-cis-Polybutadiene	100	100	100	100	100	100	100	100
		Zinc diacrylate	41.0	38.0	35.0	28.0	27.8	38.0	32.1	28.4
		Peroxide (1) <sup>1)</sup>	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		Peroxide (2) <sup>2)</sup>	0.8	0.8	0.8	0.6	0.6	0.8	0.8	0.8
		Sulfur <sup>3)</sup>	0.1	0.1	0.1	0	0	0.1	0.1	0.1
		Antioxidant <sup>4)</sup>	0	0	0	0.2	0.2	0	0	0
		Barium sulfate	24.1	25.2	26.4	29.8	29.9	25.2	12.8	14.4
		Zinc oxide	5	5	5	5	5	5	5	5
		Zinc salt of pentachlorothiophenol	1	1	1	0.2	0.2	1	1	1
		Vulcan- ization conditions	Primary	Temperature (° C.)	175	175	175	140	155	175
Time (min)	15			15	15	30	15	15	15	15
Secondary	Temperature (° C.)		—	—	—	165	—	—	—	—
	Time (min)		—	—	—	15	—	—	—	—
Hardness	Surface (JIS-C hardness)		85	83	78	76	76	83	87	80
	Center (JIS-C hardness)		61	59	55	72	60	59	63	56
	JIS-C hardness difference		24	24	23	4	16	24	24	24
Deformation under loading (mm) <sup>5)</sup>			3.4	3.8	4.1	3.3	3.4	3.8	3.4	4.1

The '791 patent is not enabled. It only teaches one how to use single core technology. That technology cannot create cores with gradients much over 40. This comes nowhere near the theoretical limit of what a core gradient can be.

Furthermore, the claims of the '791 patent are not supported by a written description which shows that Bridgestone actually possessed any technology which could create cores with a gradient significantly over 22. First, the patent does not give any example gradients over 25, and states that gradients over 30 are not preferred. Second, the patent only teaches the use of single-

layer cores, a technology that can only obtain gradients of up to around 40. There is nothing in the specification to indicate that Bridgestone was able to produce cores with a gradient over 40.

**F. No Secondary Considerations of Non-Obviousness Are Present**

It is my understanding that a patent holder may rely on objective indicia of non-obviousness, known as secondary considerations, to try and preserve the validity of its patents. In forming my opinion regarding the asserted claims of the '852, '817, '707, '834 and '791 (the "Bridgestone patents"), I have considered whether any of these secondary considerations are present. I have reviewed Bridgestone's Ninth Supplemental Response to Acushnet's Interrogatory No. 10. In that response, Bridgestone generally contends that all of its asserted patents are non-obvious for the following reasons: (a) the alleged inventions led to unexpectedly better performance results; (b) Acushnet copied Bridgestone's technology; and (c) Acushnet's golf balls were commercially successful. In addition, Bridgestone specifically asserts that the '852, '707 and '791 patents are non-obvious because of Acushnet's failure to produce golf balls with 2 layer covers, that the '834 patent is non-obvious because of the claimed invention's commercial success and that the '852 and '707 patents are non-obvious because Bridgestone licensed those patents to Callaway.

It is my understanding that for objective indicia of non-obviousness to be significant there must be a connection or nexus between the claimed features of the invention and the particular secondary consideration. In its interrogatory response, Bridgestone did not describe or explain a connection between any objective indicia of non-obviousness and claimed inventions.

For example, Bridgestone does not explain how the commercial success of any Bridgestone or Acushnet golf ball was the result of a claimed feature of any Bridgestone patent.

It is my opinion that there can be no nexus between the asserted claims of the Bridgestone patents and the commercial success of Acushnet's current products if Acushnet does not infringe the asserted claim of any of these patents. This fact is also evidence that Acushnet could not have copied the asserted claims of the Bridgestone patents.

In addition, Bridgestone's Interrogatory response does not describe or explain how Acushnet's failure to produce golf balls with two-layer covers was related in any way to a failure to use the claimed features of the '852, '707 or '791 patents. Nor does Bridgestone describe any nexus between the performance of its golf balls and the claimed features of its patents.

Finally, I understand that Callaway licensed the '852 and '707 patents in connection with the settlement of a lawsuit with Bridgestone, but this license does not indicate to me that the claimed inventions were a commercial success. Bridgestone did not describe or explain that Callaway licensed those patents based on the claimed features of the '852 and '707 patents.

In the absence of any explanation of how the secondary considerations are related to the features of the Bridgestone patents, I cannot give Bridgestone's assertions any significant weight. With respect to the '791 patent, considering the minor differences between the patent and the teachings of the '563 and '247 patents, secondary considerations of obviousness (if any are even found to be present) are of minor significance in comparison to the evidence of obviousness. The fact that the '563 and '247 patents clearly possess all of the claimed features of the '791 patent when routine optimization is used to obtain core curing conditions is strong and overwhelming proof of obviousness even if some secondary indicia of obviousness exists.

Therefore, it is my conclusion that the asserted claims of the Bridgestone patents are obvious for the reasons set forth above.

## **XI. CONCLUSION**

I reserve the right to supplement this report should new information come to light that bears on my opinions contained in this report. I reserve the right to supplement or modify this report, if appropriate, to the extent that new or additional information is provided. I also reserve the right to consider and comment on additional evidence that may be presented by experts for Bridgestone.

At trial or any hearing in this litigation, I may provide demonstrative aids, such as computer animations, excerpts from relevant exhibits, deposition testimony, and physical examples, to assist in explaining the subject matter discussed in this report.

Signed this sixteenth day of January, 2007.

/s/ David Felker  
David Felker, Ph.D.

TAB 1

**David L. Felker, PhD**

8852 Harmony Grove Road  
Escondido, CA 92029  
760-468-0816(mobile)  
760-480-7515 x13(office)

**2/01-present Owner, Sanford Rose Associates- Escondido**

- Retained executive search firm filling primarily Director to CEO positions in the Pharmaceutical and Biotechnology industries throughout the USA.

**1/01 – present Golf Ball Industry Consultant/Expert Witness**

- Provide technical advice and expert testimony in golf ball technology-relayed cases.
- Perform patent analysis and provide technical advice.
- Lead scientific efforts to demonstrate performance differences between golf products for the purpose of providing evidence to support the client's legal position.
- Perform/direct physical property testing and outdoor performance comparison testing efforts.
- Direct/perform statistically designed experiments and thorough analysis of data.

**Depositions:**

5/8/01 Callaway Golf v. Bridgestone Sports Co. Ltd., Civil Action No. 1 00-CV-1871-JEC

3/6/02 Callaway Golf Company v. Dunlop Slazenger Group Americas, Inc.  
Civil Action No. 01-CV-669 RRM

5/22/02 Callaway Golf Company v. Dunlop Slazenger Group Americas, Inc.  
Civil Action No. 01-CV-669 RRM

2003 Nitro Leisure Products, LLC v. Acushnet Company, US District Court Southern District of Florida, Case No. 02-14008-CIV-Middlebrooks

**Declarations:**

Callaway Golf v. Acushnet Company, 7/00

Callaway Golf v. Bridgestone Sports Co. Ltd., 8/00

Acushnet Company v. Nitro Leisure Products, LLC dba Golf ballsdirect.com and Second Chance, and Nitro Leisure Services, LLC dba Nitro Golf and Nitrogolf.com, US District Court Southern District of Florida, Case No. 02-14091-CIV-Roettger, 4/19/02

Nitro Leisure Products, LLC v. Acushnet Company, US District Court Southern District of Florida, Case No. 02-14008-CIV-Middlebrooks, 6/11/02

Nitro Leisure Products, LLC v. Acushnet Company, US District Court Southern District of Florida, Case No. 02-14008-CIV-Middlebrooks, 8/6/02

Nitro Leisure Products, LLC v. Acushnet Company, US District Court Southern District of Florida, Case No. 02-14008-CIV-Middlebrooks, 5/28/03

**Expert Reports:**

"Remanufactured Golf Ball Testing and Results", 4/18/02

Expert Report for Nitro Leisure Products, LLC v. Acushnet Company, US District Court Southern District of Florida, Case No. 02-14008-CIV-Middlebrooks, 7/8/03

**Courtroom Testimony:**

8/04 Callaway Golf Company v. Dunlop Slazenger Group Americas, Inc.  
Civil Action No. 01-CV-669 RRM

**12/96-10/00 Vice President of Research & Development, Callaway Golf Ball Company, Carlsbad, CA (Start-Up Company wholly owned subsidiary of Callaway Golf Company)**

- Charter member of executive team that built \$170 M Start-up Company from scratch.
- Designed and developed the entire R&D function and company's first products; \$6M R&D annual operating budget; jointly responsible for Golf Ball Company P&L.
- Lead the effort that produced four *Demonstrably Superior and Pleasingly Different* (DSPD) golf ball models: *Rule 35*, *CTU 30*, *CB-1* and *HX*". Total sales for these four products were \$55M in 2001. The Rule 35's performance set a new standard that stunned the golf ball industry. Additionally, the "HX" is revolutionary in that it is a "dimple free" golf ball.
- Lead the patent effort that enabled the introduction of patented products in an extremely crowded art; did so without legal issues at product launch.
- Inventor of golf ball/club products and golf ball manufacturing processes.

**PATENTS**

- 5,984,807 Golf Ball
- 6,200,512 Method of Manufacturing a Golf Ball
- 6,213,892 Multi-layer Golf Ball
- 6,245,386 Method and system for finishing a golf ball
- 6,390,932 Compliant polymer face golf club head
- 6,440,346 Method for making golf ball
- 6,607,451 Compliant polymer face golf club head
- 6,786,837 Golf balls and methods of manufacturing the same

**11/94-12/96: Technology Superintendent -- Neoprene, DuPont Dow Elastomers, Louisville, KY**

- Responsible for: World-wide Neoprene Adhesives and Latex Development & Technical Services, Hypalon™ Adhesives Development & Tech Services, Louisville Manufacturing Technical Support (worlds largest polychloroprene facility), Capital Project Implementation (\$15-25M in capital projects/yr), World-wide Neoprene Research & Development, Technical support of Quality Control and Environmental Laboratories
- Directed 50 person organization; \$6M Technology Budget
- Leader of high priority Task Team of scientists from DuPont, DuPont-Dow Elastomers and various Universities working on the next generation process and products.



**9/91-11/94: Technical Area Superintendent - Neoprene, DuPont Company, Louisville, KY**

- Responsible for: Manufacturing Engineering & Process Support, Capital Project Implementation (\$10-40M in Capital projects/yr), ISO 9000 Certification, Quality Control and Environmental Laboratories, and Technical Computing Upgrade. Managed 16 person organization; \$2M Technology Budget.
- Working-Leader of International Task Team that solved 40 yr old Neoprene Quality/Manufacturing problem, delivering >\$10M/yr ATOL.

**9/90-9/91: Hypalon™ Technology Area Superintendent**

**Elastomers Division, DuPont Beaumont Works, Beaumont, TX**

Responsibilities same as 9/89-9/90 position plus responsible for :

- Research & Development of a CCl<sub>4</sub>-free Commercial HYPALON™ Process.
- Process development and production of chlorinated EVA/PE polymer in elastomer plant.
- Montreal Protocol liaison for HYPALON™ Business.
- Assembled and lead task team of scientists, lobbyists, and lawyers who developed and implemented a creative win/win solution to a HYPALON™ environmental problem that literally saved the business (\$>30M NPV). Received DuPont Board of Directors Award for preventing Shutdown of HYPALON™ Business.

**9/89-9/90: Hypalon™ Manufacturing Technology Area Superintendent**

- Managed group of 10 responsible for Plant Manufacturing Engineering, Capital Project Implementation, Technical support of Quality Control and Environmental Laboratories
- Received DuPont Award for increasing plant production of Cl-EVA 400% using fundamental process understandings and statistically designed experiments.

**9/86-9/87: Product Development Engineer: Nylon Compounding/Elastomer Toughened Polymers, DuPont Washington Works Plant, Parkersburg, WV**

Developed family of elastomer toughened/reinforced ZYTEL™ compounded products with super high flow properties. Responsible for plant engineering support for carbon black filled Nylon and polyester products.

**9/87-9/89 Manufacturing Engineer: DuPont Advanced Glazing Venture, Parkersburg, WV**

Part of Team that successfully developed and introduced the Anti-Lacerative Windshield™ and SpallShield™. Primarily responsible for pilot plant operation and managing contract coating operations with w/ Polaroid Corp, Custom Coating & Laminating Inc. and Rexham Corp.

**10/84-9/86: Research Engineer Long Range Research Group**

**Polymer Products Department, DuPont Experimental Station, Wilmington, DE**

Product and Process R&D focused on a ARYLON™ (new aromatic polyester targeted at the auto industry).

# EDUCATION:

Aug 1984: Iowa State University, Ames, Iowa

Ph.D. Chemical Engineering. Thesis: Electrochemical dissolution of copper sulphide minerals using a Fluidized Bed Electrochemical Reactor.

Recipient of the Iowa State University Mining & Mineral Resources Research Institute Fellowship, 1981-1983. Overall G.P.A. 3.69/4.00

M.S. Chemical Engineering Aug 1982. Thesis work included experimental and mathematical studies dealing with the electrodeposition of copper using a fluidized bed electrochemical reactor. Overall G.P.A. 3.68/4.00

University of Wisconsin-Eau Claire, Eau Claire, Wisconsin 1976-1979

Received B.S. in Chemistry May of 1979. Class work included advanced organic chemistry and several semesters of independent research. Overall G.P.A. 3.20/4.00

# OTHER ACADEMIC RESEARCH EXPERIENCE:

1979--National Science Foundation Undergraduate Research Participant. Worked under the guidance of Dr. George A. Kraus, Department of Chemistry, Iowa State University. Research included the investigation of the reaction of dienolate anions with Michael acceptors.

1977-1979--Research Assistant at the University of Wisconsin-Eau Claire. Worked under the guidance of Dr. William C. Groutas. Research included the synthesis of functionalized alpha methylene valerolactones fused to substituted aromatic rings, pancreatic elastase inhibiting imidazole-N-carboxamides, and N,N'-ethylene bis [2(2-hydroxy-5-bromophenyl)] glycine.

# PAPERS PUBLISHED

William C. Groutas and David L. Felker, "Synthetic applications of Cyanotrimethylsilane, Iodotrimethylsilane, Azidotrimethylsilane, and Methylthiotrimethylsilane," Synthesis, No. 11, 861-868, November (1980).

William C. Groutas, David L. Felker, David R. Magnin, George Meitzner, and Terry Gaynor, "Synthesis of Functionalized Alpha-Methylene Lactones" Synthetic Communications 10 (1), 1-9 (1980)

William C. Groutas, David L. Felker and David R. Magnin, "Synthesis of Aromatic AlphaMethylene Lactones", Synthetic Communications 10 (5), 355-362 (1980).

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Videotape : How to Grow Gourmet Oyster Mushrooms, April 1995

"Advances in Neoprene Technology", 1996 (definitive scientific text internally published in DuPont under my direction)

#### PAPERS PRESENTED:

22nd Undergraduate Chemistry Symposium, Minnesota Chapter of the American Chemical Society, Bethel College, Spring 1978, "Design and Synthesis of Potential Cytotoxic Agents", coauthored by William C. Groutas and David L. Felker, presented by David L. Felker.

Society of Mining Engineers of the AIME Fall Meeting and Exhibit, Minneapolis Auditorium and Convention Hall, Minneapolis, Minn., Oct. 22-24, 1980, "The Electrowinning of Copper from Sulphate Solutions in a Fluidized Bed Electrochemical Reactor", coauthored by Chang C. Ko, David L. Felker, Harvey Jensen, and Renato G. Bautista, presented by David Felker.

The Metallurgical Society of the AIME Annual Meeting, Dallas Convention Center, Dallas, Texas, Feb. 14-18, 1982, "Design Considerations for the Scale-Up of a Fluidized Bed Electrochemical Reactor (FBER)", coauthored by David L. Felker and Renato G. Bautista, presented by David L. Felker.

The Metallurgical Society of the AIME Annual Meeting, Hyatt Regency Hotel, Atlanta, Georgia, March 6-10, 1983, "A Model for Predicting the Concentration-Time Relationship using a FBER", coauthored by David L. Felker and Renato G. Bautista, presented by Renato G. Bautista.

TMS-SME Annual Mtg, Denver, Colorado, Feb 24-27, 1987, "A mathematical model for the electrochemical reduction of chalcopyrites using a fluidized bed electrochemical reactor", coauthored by David L. Felker and Renato G. Bautista, presented by David L. Felker.

TMS-SME Annual Mtg, Denver, Colorado, Feb 24-27, 1987, "The two-stage dissolution and separation of Cu, Fe, and S from chalcopyrite using a fluidized bed electrochemical reactor", coauthored by David L. Felker and Renato G. Bautista, presented by David L. Felker.

Proprietary Presentations at DuPont Polymer Products Department annual TBCH-CON, 1985, 1986.

Proprietary Presentation at DuPont Polymer Products Department annual Polymer Compounding Conference, Parkersburg WV, 1987.

#### PERSONAL DATA:

U.S. Citizen, married, born 6/10/57, 6'1", 200 lbs., excellent health.

Hobbies and interests include swimming, painting, hiking, skiing, tennis, flying military aircraft, golf and fly-fishing.

**TAB 2**

**Prior Art Golf Ball Test Results**

Ball Type: Wilson Ultra Tour Balata log # 93007  
 Ultra Tour Balata 90 Golf Balls obtained in 1993.

**Diameter before Sandblasting (Ball Diameter), in**

	<u>Pole</u>	<u>EQ1</u>	<u>EQ2</u>	<u>Avg Diam</u>
1	1.684	1.685	1.686	1.685
2	1.683	1.687	1.688	1.686
3	1.682	1.684	1.686	1.684
4	1.683	1.686	1.688	1.687
5	1.680	1.684	1.684	1.683
6	1.687	1.686	1.685	1.686
7	1.685	1.689	1.687	1.687
8	1.681	1.686	1.684	1.684
9	1.682	1.684	1.686	1.684
10	1.680	1.686	1.687	1.684
11	1.686	1.689	1.687	1.687
12	1.683	1.685	1.685	1.684

**Diameter after Sandblasting (Sandblasted Ball Diameter), in**

	<u>Pole</u>	<u>EQ1</u>	<u>EQ2</u>	<u>Avg Diam</u>
1	1.679	1.681	1.680	1.680
2	1.678	1.684	1.682	1.681
3	1.678	1.682	1.681	1.680
4	1.682	1.684	1.684	1.683
5	1.675	1.681	1.679	1.678
6	1.683	1.681	1.683	1.682
7	1.681	1.682	1.682	1.682
8	1.678	1.681	1.681	1.680
9	1.678	1.682	1.681	1.680
10	1.678	1.682	1.682	1.681
11	1.680	1.682	1.683	1.682
12	1.680	1.682	1.683	1.682

Diameter after cover is removed (Casing Diameter), in

	<u>Pole</u>	<u>EQ1</u>	<u>EQ2</u>	<u>Avg Diam</u>
1	1.576	1.582	1.578	1.579
2	1.581	1.583	1.581	1.582
3	1.577	1.583	1.588	1.583
4	1.577	1.586	1.585	1.583
5	1.580	1.587	1.583	1.583
6	1.580	1.587	1.587	1.585
7	1.586	1.585	1.584	1.585
8	1.574	1.587	1.586	1.582
9	1.573	1.584	1.585	1.581
10	1.575	1.579	1.583	1.579
11	1.580	1.585	1.581	1.582
12	1.577	1.582	1.583	1.581

Thickness of the Cover, in

	<u>Ball-core diam</u>	<u>Sandblasted ball-core diam</u>
1	0.053	0.051
2	0.052	0.050
3	0.050	0.049
4	0.052	0.050
5	0.050	0.048
6	0.050	0.049
7	0.051	0.049
8	0.051	0.049
9	0.052	0.050
10	0.052	0.051
11	0.052	0.050
12	0.052	0.051

Specific Gravity of the core

1.132  
1.126  
1.131  
1.135

Specific Gravity of the Inner Cover Layer

0.963  
0.975  
0.966  
0.961

Core Diameter, in

	<u>Pole</u>	<u>EQ1</u>	<u>EQ2</u>	<u>Avg Diam</u>
1	1.528	1.526	1.526	1.527
2	1.526	1.524	1.527	1.526
3	1.526	1.524	1.523	1.524
4	1.529	1.526	1.526	1.527
5	1.526	1.526	1.523	1.525
6	1.528	1.527	1.526	1.527
7	1.527	1.525	1.526	1.526
8	1.523	1.520	1.521	1.521
9	1.528	1.526	1.524	1.526
10	1.524	1.521	1.522	1.522
11	1.525	1.524	1.523	1.524
12	1.522	1.522	1.521	1.522

Inner Cover Layer thickness, in

	<u>Casing- Core diam.</u>
1	0.026
2	0.028
3	0.030
4	0.028
5	0.029
6	0.029
7	0.030
8	0.030
9	0.028
10	0.028
11	0.029
12	0.030

Inner Cover Layer Hardness (on ball) (JIS-C)

	N. Pole	S. Pole	Avg JIS-C
1	87.4	92.0	89.7
2	90.0	85.4	87.7
3	84.7	87.9	86.3
4	84.8	89.1	87.0
5	86.4	86.9	86.6
6	85.0	91.0	88.0
7	91.9	87.6	89.8
8	91.1	89.2	90.2
9	88.7	88.2	88.4
10	88.4	87.4	87.9
11	85.8	90.6	88.2
12	86.3	90.4	88.4



# EXHIBIT B

REDACTED

# EXHIBIT C

**REDACTED**

# EXHIBIT D

**REDACTED**

# EXHIBIT E

**REDACTED**



# EXHIBIT F

**REDACTED**

# EXHIBIT G

**REDACTED**

# EXHIBIT H

**REDACTED**

# EXHIBIT I

**REDACTED**



# EXHIBIT J

REDACTED